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WEB SITE AND INFORMATION SYSTEM FOR IDAMAN REALTY

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Acknowledgement

This dissertation is done as part of fulfilling the criteria in awarding the Degree in Information Technology (Honours) from the University of Malaya. I have chosen the topic of real estate to write my dissertation on. The system that I will be developing is a web application and information system for a real estate company named IDAMAN REALTY. This thesis carries 4 credit hours and is done to make up the remaining 120 credit hours for this course.

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Abstract

I have chosen this topic of designing a web site for a real estate company as my project. This system which will be developed will give Idaman Realty an opportunity to have their own web site, whereby they can conduct business and attract customer to their company. This project is done in 2 part, WXET 3181 and WXET 3182. WXET 3181 will involve the system's proposal and documentation. While WXET 3182 will involve designing, implementing, testing and evaluating the system. This project is done as part of fulfilling the requirements for a Bachelor's Degree in Information Technology. I hope this system will benefit Idaman Realty and also to increase my knowledge in developing a system as well as understanding the real estate business. I wish to express my appreciation to all who have had a part in making this project a success.

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POSSIBLE ABBREVIATIONS USED

IR	Idaman Realty
IP	Internet Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
DFD	Data Flow Diagram
ER	Entity Relationship
ODBC	Open Database Connectivity
JDBC	Java Database Connectivity
API	Application Programming Interface
IEEE	Institute of Electrical & Electronic Engineering
OS	Operating System
SSL	Secure Socket Layer
SET™	Secure Electronic Transaction
GUI	Graphical User Interface
NSA	United States National Security Agency
XML	Extensible Markup Language
HTML	Hyper Text Markup Language
ASP	Active Server Pages
SGML	Standard Generalised Markup Language

CHAPTER 1 INTRODUCTION

In this chapter, a brief overview of the proposed system will be given. The purpose of this system and its functions will be given to enable users to better understand the system. The objectives, scope and advantages as well as the disadvantages of the system compared to the current available system will be given.

1.1 System Definition

The system that I have proposed to develop is designing a website for a real estate company. The intended system is being developed for Idaman Realty, a real estate agency established since 1995. The system is a web application for an agent based real estate company. The system will enable Idaman Realty to do business and provides users with an information system about real estate management. This system integrates a new way to operate business which is E-commerce, to replace the traditional way of doing business. The system incorporates functions for 2 types of users; external and internal. The internal users are the system administrator and the estate agents meanwhile the external users are the property seekers. This system will help the management manage their business efficiently as nowadays businesses are being done electronically.

The purpose of creating this system is also to help Idaman Realty to stay abreast in the property market and be competitive, as most businesses and transactions are performed online these days. Users will be able to view the intended properties and decide if they wish to purchase it. By doing business this way, it will be easier for Idaman Realty to manage their resources. This system will also go to show that business hours need not be from 9-5 only, but can be done anytime and from anywhere, as long as users have access to a computer. This system will also incorporate multimedia features and it will be used when displaying the images of the properties. When the users click on the image of the property, they can view the materials used for the buildings. There is also an option in where users can choose their own home design in the "Do-It-Yourself" link. This feature will only be available for property seekers that are looking for houses.

1.2 Objectives

This system has a few main objectives which are :

- Enable users to search for property

Users can search for the intended property that they wish to buy/rent. The search can be done by entering the type of property, budget and area.

- Enable users to get information

Users can learn the step-by-step process of purchasing a property and also to get the latest information and updates in the real estate field in Malaysia.

- Provide a platform for the company to expand business

The management are able to do business online, manage their resources and update their information.

- Create an user friendly system for all.

The system is supposed to be easy to use with graphical user interface that guides all users in navigating through the system.

- Provide an effective and efficient communication channel.

The system will enable the external users to keep in touch with the agents and reduce communication time.

- Provide a feature for users to interact with system.

The system will enable users to create their own home design in the "Do-It-Yourself" feature.

1.3 Scope

This system is intended for its own target users which are the internal users and external users. The internal users are the management which consist of estate agents and the system administrator, meanwhile the external users are the property seekers and property owners. The internal users like the system administrator can fully control and manage the database, fine tune performance and also perform creation, deletion and modification to the existing system to manage the incoming and outgoing properties. Meanwhile the agents can deal with customers who visit the website. The external users can view the

available properties or perform a search according to their liking, and communicate with the available agents.

1.4 Constraints & Limitations

The system will have its advantages and disadvantages like any other system. This system will be developed on a Windows 98 platform, which is a very stable and common platform used in companies. The database and web server used will be Microsoft products. The system will also enable the management to update the information and stay in touch with the users.

The most common problem will be that the agents must be proficient in information technology skills like navigating through the site and updating the information. Not all agents will be fully capable as it will require proper training and the cost for sending these agents for training will be high. The system will also need an online payment facility for users and also a very secure medium for its transaction of information and also any payment information. Due to the strict Bank Negara ruling and also bank policies on account confidentiality, getting an online merchant account for any internet payment transaction is impossible for this system.

To make this system a secured system that will convince users to make online payment, SSL (Secured Socket Layer) protocol that is the standard encryption and security protocol for Internet has to be incorporated into the system. Unfortunately, it will have to liase with a Certificate Authority (CA) to get a server digital certificate. The digital certificate has to be bought from the CA and other information like URL for the system and information of the company that runs the system has to be submitted together to purchase the certificate. It is nearly impossible to incorporate this type of function.

Besides that, the property images that are included will not have the exact name or resource that have actually been used in the building of the property. This is because the current owner of the property cannot give the exact details as to the materials used, for

he/she might not have been the original owner from the time the property was built. Therefore it will be given on an estimation only.

CHAPTER 2 LITERATURE REVIEW

This chapter will give the comparisons between the currently available systems on the Internet and the proposed system. A detailed study is done on the system architecture and development tools. At the end, a brief summary on the system as a whole will be provided. Motivation on how the ideas of the system was generated is also discussed.

2.1 Motivation

- Traditional approach

In the past years, real estate has been practiced in the usual way of contacting an agent if they want to sell or buy a property. If the property is in Johor, the prospective buyer would have to go all the way to Johor to see the property and then decide if he wants to buy it. If the buyer is not keen, then he would have to return home empty handed, with a failed negotiation behind him. It will also mean that he failed in owning his dream home or prospective property that he has been searching for. By his traveling to Johor also, he would have to spend money on traveling and other expenses. Besides that, he would have to apply for a day off to go and see the property that he wishes to buy. If the deal was not successful, then he would have wasted his time and money in traveling all the way there. The agent would also be unhappy as he didn't 'seal' a deal. The buyer and agent would also be experiencing depression due to that as the buyer had failed in finding his/her dream house and the agent failed in earning more commission. Therefore, it has been a tedious process for buyers to look for their properties and for agents also. It all depends on the agents communication skills in convincing the buyer and making the property seem like the "dream" property to be owned.

- New approach

With the advent of new technologies, real estate agency has also become a web based application. By doing businesses online, communication time can be minimized. In the past when buyers want to view a property they have to go to the exact location to see it. But with real estate done online, buyers can view the prospective properties from the

comfort of their homes as long as they have a computer. With the click of a button, they can view the property from different views and get all the necessary information without going to the actual site. This can also minimize cost as they will save money on travel expenses for they need not travel very far to view the prospective property. This is more easier and cost-effective as the buyer gets to choose his property to his liking and the real estate company can also make profit by selling any of its available properties.

2.2 E-commerce

The Internet and World Wide Web are revolutionizing conventional business models and in some cases producing new ones. For example, before the World Wide Web, most people did not participate in auctions. With the advent of eBay and other online auction sites, however, people are auctioning off everything from computer games to gardening tools. E-business

According to the **EC Innovation Centre**, E-commerce is defined as "*the enablement of a business vision supported by advanced information technology to improve efficiency and effectiveness within the trading process*".

E-business has become standard operating procedure for the vast majority of companies. Setting up and running an e-commerce site, especially one that processes a large number of transactions, require technical, marketing and advertising expertise. Customers want access to products and services on a 24-by-7 basis, and the easiest way is to move operations online. The businesses that provide the most reliable, most functional, most user-friendly and fastest services will be the ones that succeed. People are currently able to pay their bills online, write and cash cheques, trade stocks, take out loans, mortgage their homes and manage their assets online. Money as we know it may cease to exist, replaced by more convenient technologies such as smart cards and digital cash. All that a person will need to go shopping is a connection, a computer, and a digital form of payment.

The transition from brick-and-mortar businesses to "clicks" business is happening in all sectors of the economy. It is now possible for a business to work without an office, because employees can conduct all communication via phone, voice mail, fax, e-mail and the emerging capabilities of the Internet. There are already Internet services that integrate phone, fax, voice and e-mail, and in the future, new technologies will further facilitate the virtual office. [1]

And now, another new trend is "opt-in e-mail" in which web users voluntarily sign up to receive e-mail, usually containing ads about product catogories or other subjects they are interested in.

2.2.1 Category of E-commerce.

The are 4 main categories of E-commerce, which are:

- ✓ Business to Business (B2B)

  Companies will use a network for ordering their goods from their supplier, receive invoice and make payment. This category has been well established for several years, particularly using Electronic Data Interchange (EDI) over private or value added networks.

- ✓ Business to Administration (B2A)

  Includes all transactions between companies and government. For example, in USA, the government procurement will be publicized over the Internet and companies can respond electronically. This category is still in its infancy, but it would expand quite rapidly as government use their own operations to promote awareness and growth of economy.

- ✓ Business to Customer (B2C)

  Mostly refers to e-retailing. Also expanded greatly with the advent of the World Wide Web. There are new shopping malls all over the Internet that offers al manners of consumer goods, from cases and wine to computer and automobiles.

✓ Customer to Administration (C2A)

Category that hasn't emerged yet. However in the wake of a growth of both the Business to Customer and Business to Administration categories may extend transaction to such areas as welfare payment and self assessed tax returns.

2.3 Real Estate Agent

An Estate Agent is defined as "a person action on behalf of a vendor or purchaser or lessor or lessee of land or buildings in matters directly connected with the sale or letting thereof". [2]

An agent is needed because :

- endeavours at all times to provide competent and honest service and advice;
- provides professional service and carry out his duties and obligations in compliance with the Act and rules of the Board of Valuers, Appraisers and Estate Agents;
- protects the public against fraud, misrepresentation or unethical practices in connection with real estate transactions;
- ensures that instructions are always treated as confidential and acted upon with discretion;
- saves time and trouble of having to show the property;
- discuss your needs and conceptualise your ideas and work within your budget;
- advise and help in identifying suitable properties to invest for maximum rental income and capital appreciation;

- identify and introduce the right property bearing in mind your needs, requirements, social status or standing in society;
- provide and advise on the prevailing market conditions, the law and other essential facts and policies which affects the real estate industry;
- ensures that the advertising and marketing of a property is done in compliance with the professional criteria;
- does his best to maximise the selling opportunities for the Vendors;
- provides the maximum choice for purchasers and tenants;
- negotiates for the best price with the most favourable terms of payment;
- advice on real property tax;
- advice on sale, purchase, rent or lease agreement terms to protect your interest;
- ensures that the obligations between the parties concerned are clearly defined in the agreement and adhered to;
- ensures that transactions are done in the fairest and in the best possible manner and that the client's interest should be protected as he would his own.

2.4 Existing system reviews

In this section, I will briefly describe some of the local and foreign websites on real estate. The advantages and disadvantages of these sites will also be provided and finally a summary is also included.

❖ Local websites

1. Property Zoom [3]

This site is quite famous n Malaysia as the information provided is up to date. The Graphical User Interface (GUI) used is also very attractive and users can identify what they want. This site lacks visibility though as there are too much information on the main page. Users can get confused with so many links to choose from. Features that are provided are like Find a property, Sell a property, Finance center, e-developer, Agents login, e-retailer as well as Resources. Latest property that are available is advertised under 'Features' and a picture of the property is also included. There are many useful links that users can refer to, like ideas on home furnishing.

2. Malaysian Institute of Estate Agents (MIEA) [2]

MIEA which stands for Malaysian Institute of Estate Agents is a local website that gives the latest information on the property market in Malaysia. It is more suitable for registered agents, for its easier to access. The features that are provided are Property center, Finance center, News center, Guidance center and Agents center. The GUI is simple and clear with easy access to information. There are 2 sections that users can access, either as consumer or agent. There are also other useful links to other real estate sites available. Under the Agents center, users can search for agents according to Agencies that have been registered with MIEA. Some of the agencies that are registered are SK Brothers, Eden Properties, Khoo & Associates, Kim Realty, etc.

3. Metrohomes [4]

This is also a local site with an attractive GUI. Users can easily identify what they want. On the main page, only the important links are given, for exampleAbout us, News, Career, Contact, Property search and New projects. Once users have chosen any of this link, they will have access to the next page which provide features such as

About us, News, Career, Contact, New projects, Auctions & tenders and Property search. This site uses CSS (cascading style sheet) and is easy to navigate. There is a loan calculator provided as a pop up window for users. The property search can be done according to type of property, the purpose; which is either rent or sale and according to area. On the main page also, users/developers can submit their tender for any property.

❖ Foreign websites

1. Realtor.com [5]

This is an American website for real estate. The GUI is simple, but is very clattered and lacks visibility. There are too many links and buttons on the main page. But there are many features available, for example Apartments, Neighborhoods, Finance & Insurance, Moving, Home Improvements etc. There are many link available to other sites and this could be an advantage for users as they can search for anything easily. Users can login to the home planner for more options. The properties listed are also divided to homes, newly built homes, condominiums, multifamily, lands, farms and commercial properties. There is a suggestion box for users to send in comments and also latest updates on interest rates are provided.

2. Century 21 Australia [6].

This website is an Australian website. Has a very attractive main page, which is the company's logo. We have to click the logo to gain access to the features and links provided. The icons and images used are more user-friendly and stresses on serving the customer. It is easy to navigate in this site. Among the features provided are Find a property, Find an agent, About us/join us, Communities, Information, Finance, Contact us and Resource center. There is a map provided for users to choose the area to perform the property search. If users are interested in looking for a job, they have to complete a short course to get a Certificate first before proceeding further.

3. ERA Real Estate [7]

This website is a Singapore based real estate company. Provides an interactive GUI with the map of Singapore on the main page. Few of the features that are available are Buying, Renting, Selling and Market analysis. They have other links also that provide information on useful telephone numbers, show house, new developments and products & services. Users can gain easy access to this site and is user-friendly. This site also gives the latest news in Singapore. Users can click on the intended area in the map to view the profile of the center director in that area. There is also a home warranty plan included.

Summary

After analyzing a few local and foreign websites, I have an idea on what is the common links and resources used. Most of the sites have links to a property site, information site and a company profile site. Only a few sites have news on financing and latest developments in the property market. These sites also do not have any online transaction process available, except for the American websites. It is also a very common thing to see that these sites only provide e-mail facilities for its members. Customers can only communicate with the agents through e-mail or telephone. Very few websites allow the users to communicate directly with the agents, for example through online 'chatting' or messenger facilities. It will be a good idea to create a website that incorporates this feature and provides loan calculators also. Most of the websites do not provide for users feedback, but the usual e-mail. I will include a weekly question to get users feedback on the system and the company. Users can also add their prospective property that they are interested to buy to the shopping cart. For this feature, the users will be able to advertise their property in the company's website and it can be done for a limited period of time, for example 2 weeks. When the time period is nearly up, owners of properties that have advertised will be sent an e-mail reminding them that their advertisement will be expiring soon. They can then proceed to register themselves into the system or look for other avenues to advertise their property. There will also be a simple messaging system for the users to communicate with the agents and users can see which agents are currently

online. For this system, there will also be multimedia features used in the property images. When a user views the property online, he/she can click on any part of the property to get information, for example the materials used in building. If the users are still not satisfied with the property, they can then proceed to design their own home and find similar matches to it. For this feature, Macromedia Flash and Director will be used.
In this system also, preference will be given to customers to make payment first. If a user wishes to reserve a property, he can do so for 3 days only and will be notified by e-mail once the time limit has expired. Besides that, if 2 customers have shown interest in the same property and everything is to their liking for example location, price, etc ;the property will then be sold to the customer who makes payment first. This is on a 'first-come-first-serve' basis.

2.5 Security

The explosion of e-business and e-commerce is forcing businesses and consumers to focus on Internet security. Consumers are buying products, trading stocks and banking online. They are entering their credit-card numbers, social-security numbers and other highly confidential information through Web sites. Businesses are sending confidential information to clients and vendors over the Internet. At the same time, we are experiencing increasing numbers of security attacks. Individuals and organizations are vulnerable to data theft and even shut down e-businesses. Security is fundamental to e-businesses. According to a study by International Data Corporation, organizations spent $6.2 billion on security consulting in 1999, and they expect the market to reach $14.8 billion by 2003 [1].

Users of intermediary computers do not monitor the Internet traffic that routes through them, but someone could intercept and eavesdrop on private conversations or credit card exchanges. These intruders might replace information with their own and send it back on its way. Therefore, information that is sent between hosts and clients can be more secure by using encryption; where the data is disguised before sending it over the Internet. That way, if someone intercepts it, the data is meaningless and impossible to change without

the alteration being known to the intended recipient. Without security precautions, a system might encounter 3 types of problem, which are eavesdropping, modification and impersonation. In eavesdropping, the information is intact, but the privacy of it has been compromised. In modification, the original information has been changed or replaced and sent to the recipient, meanwhile when the information passes to a person who poses as the intended recipient, then it s known as impersonation.

Security protocols

Everyone using the Web for e-business and e-commerce needs to be concerned about the security of their personal information. There are several protocols that provide transaction security, such as Secure Sockets Layer (SSL) and Secure Electronic Transaction (SET).

✓ SSL

The SSL protocol, developed by Netscape Communications, is a non-proprietary protocol commonly used to secure communication on the Internet and the Web. SSL is built into many Web browsers, including Netscape Communicator, Microsoft's Internet Explorer and numerous other software products. It operates between the Internet's TCP/IP communications protocol and the application software.

SSL uses public-key technology and digital certificates to authenticate the server in a transaction and to protect private information as it passes from one party to another over the Internet. SSL transactions do not require client authentication. To begin, a client sends a message to a server. The server responds and sends its digital certificate to the client for authentication. Using public-key cryptography to communicate securely, the client and server negotiate *session keys* to continue the transaction. Session keys are symmetric secret keys that are used for the duration of that transaction. Once the keys are established, the communication proceeds between the client and the server by using the session keys and digital certificates.

Although SSL protects information as it is passed over the Internet, it does not protect private information, such as credit card numbers, once stored on the merchant's server. When a merchant receives credit card information with an order, the

information is often decrypted and stored on the merchant's server until the order is placed. If the server is not secure and the data is not encrypted, an unauthorized party can access that information. Hardware devices called PCI (Peripheral Component Interconnect) cards can be installed on Web servers to secure data for an entire SSL transaction from the client to the Web server. The PCI card processes the SSL transactions, freeing the Web server to perform other tasks.

✓ SET™

The SET protocol, developed by Visa International and MasterCard, was designed specifically to protect e-commerce payment transactions. SET uses digital certificates to authenticate each party in an e-commerce transaction, including the customer, the merchant and the merchant's bank. Public cryptography is used to secure information as it is passed over the Web.

Merchant's must have a digital certificate and special SET software to process transactions. Customers must have a digital certificate and *digital wallet* software. A digital wallet is similar to a real wallet; it stores credit (or debit) card information for multiple cards as well as digital certificate verifying the cardholder's identity. Digital wallets add convenience to online shopping; customers no longer need to re-enter their credit card information at each shopping site.

In the SET protocol, the merchant never sees the client's proprietary information. Therefore, the client's credit card number is not stored on the merchant's server, considerably reducing the risk of fraud.

Although SET is designed specifically for e-commerce transactions and provides a high level of security, it has yet to become the standard protocol used in the majority of transactions. Part of the problem is that SET requires special software on both the client and server side; that requirement increases transaction costs. Also, the transactions are more time-consuming than transactions using other protocols, such as SSL.

Type of security to be implemented.

i. Restriction of IP addresses

Only browsers connecting from certain IP addresses, IP subnets or domains can access the system. This applies to users such as the system administrator.

ii. Restriction by username and password

Users must provide their information to get access to the system. Therefore, they need to register.

iii. Encryption using cryptography

Encrypt both requests for documents and document itself in such a way that the text cannot be read by anyone but the intended recipient. Will be used for reliable user verification.

iv. User type restriction

Only particular type of users will be permitted to access certain type of data, for example only agents of IR.

CHAPTER 3 METHODOLOGY

After analyzing the surveys and findings from the literature review in the previous chapter, this chapter will specify the justifications for the chosen methodology for the project. It will include project planning and all outlined procedures that should be covered in order to understand the project requirements better.

3.1 Planning

3.1.1 Development strategy

In developing this system, I needed the co-operation of the principal and agents of Idaman Realty. I choose this company as they had been looking for an opportunity to go online and do business, as well as manage their resources. Firstly, I had an *interview* with the principal (owner) and system administrator for IR. As this is a small company, it will be easier to develop a web based management system. From this interview, I obtained all the necessary information that needed to be included in the website for IR to do business. A brief history of the company was given to me. I also interviewed the agents to get their personal profile to be included in the website. After this, I did some *observation* on how the agents did business and met clients. Until now, the company relies on advertisements at available property sites and introductions to prospective buyers to gain business contracts. After observing their business dealings, I did some research on the property market in Malaysia to get an insight. I also went through some websites on other real estate companies to get an idea for designing and organizing the collected information. Once I had enough information, I did my planning and a rough outline of the proposed system. After the initial planning, I met with the System Administrator and Principal of IR to present my idea. Once the requirements and objectives were stated and planned, I begin my work on designing the system for IR.

3.2 Systems Requirement

3.2.1 Functional requirement

The functional requirements will define all the functions that are available to the users; external and internal. The functional requirements are as follows :

Internal user (system administrator, agents)

1. System Administrator can update the database – create, delete, modify and add groups. Any new properties added will be sorted according to date and added to database.
2. System Administrator can update information on the MIEA, company profile and other information like bank loans, site map, properties
3. System Administrator can view the resumes that have been submitted and send reply.
4. Agents can view their personal records and modify it.
5. Agents can communicate with property seekers through e-mail.

External user (property seekers)

1. Users can login and personalize this site.
2. Users can register to have their own calendar or profile
3. Users can search for properties according to area, budget, and type of property.
4. Users can view the information such as company profile, current bank loans available, the site map for property and get latest updates on upcoming housing projects.
5. Users can get a guideline on how to purchase a property, as well as terms and conditions that apply.
6. Users can view available vacancies in the company and send their resumes online.
7. Users can get a link to MIEA for more information.
8. Users can get information on the image and materials used in the building of the property.
9. Users can design or create their own home according to the guidelines provided and find similar houses for sale/rent that match their creation.

10. Users can advertise their own property for a limited time period if they do not wish to go through an agent.

3.2.2 Non-functional requirements

The non-functional requirements will define the systems properties. For this system, it is intended that the users can navigate through the system easily, with sufficient help from the icons and provided guidelines. There are 6 non-functional requirements that I have identified for this system and they are described as follows :

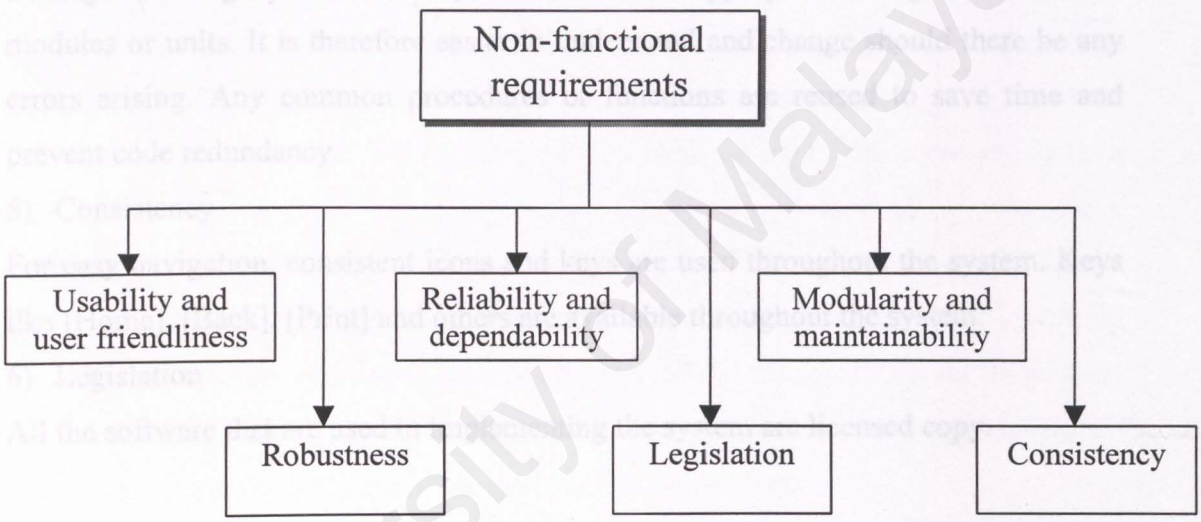


Figure 1 Non-functional Requirements

1) Usability and user friendliness

This system uses GUI and has suitable icons, prompts and instructions to guide users. When a particular step or transaction has been performed, a prompt window will appear to confirm that the user has chosen that step. There is also a confirmation message for deletion or updating information. Besides that, there is adequate documentation for installation.

2) Reliability and dependability

This system is definitely a reliable one and it doesn't cause any physical or economical damage. Any system failure can be easily rectified, thus reducing costly damages or failure.

3) Robustness

This system has many units that have been integrated together to form the whole system. In ensuring that the system functions properly, all the different modules should work together and produce the expected outcome. When the modules are integrated and tested, any identified problems that arise are solved immediately. Therefore the systems robustness can be maintained to the user's expected level.

4) Modularity and maintainability

During the design process, the system codes and appropriate designs are done in modules or units. It is therefore easier to understand and change should there be any errors arising. Any common procedures or functions are reused to save time and prevent code redundancy.

5) Consistency

For easy navigation, consistent icons and keys are used throughout the system. Keys like [Home], [Back], [Print] and others are available throughout the system.

6) Legislation

All the software that are used in implementing the system are licensed copy.

3.3 Process Method

In developing this system, 4 main and fundamental process activities are used, which are specification, development, validation and evaluation. In the specification process, the functionality of the system and constraints on the operations must be defined. In the development process, the system to meet the specification must be produced. In the validation process, the system must be validated to ensure that it does what the customer wants and in the evolution process, the system must evolve to meet the changing customer needs. There are generally different models of software development, which is

- The waterfall approach
- Evolutionary development

- Formal transformation
- System assembly from reusable components

The advantages in using *Waterfall model* is that it is simple to implement and manage and well used. Meanwhile the disadvantages are that real projects are not sequential, the requirements cannot be stated early and the customer does not see the system until after testing. The emphasis is on ease of project management and the methods used does not scale up to large projects well.

The *Evolutionary model* is often used when some aspects of the system are not well defined. The basic steps are obtain requirements from customer and identify areas of uncertainty. Then a quick design of systems aspect is done for customer and a prototype is implemented. The prototype is then used to refine the requirements of the system. These steps are repeated until the requirements are well defined. The prototype is then "thrown away". The advantages in using this model is that customers can provide input early during development of the prototype. It also helps reduce problems in requirements which are expensive to fix. Meanwhile the disadvantage is that customers see a working version early and unless they have basic knowledge of the process, will not understand why it needs to be "thrown away". Customers will also see the prototype developed quickly and may not understand why the real version takes longer.

I have used the ***Waterfall model*** in this system's development.

3.3.1 The waterfall model

This model makes the development process more visible and because of the cascade from one phase to another, this model is known as the 'waterfall model' [8].

The principal stages of this model map onto the fundamental development activities :

1. Requirements analysis and definition

   The system's services, constraints and goals are established by consultation with system users. They are then defined in a manner which is understandable by both the users and developer.

2. Systems design

   The system design process is divided to hardware and software requirements, which will establish an overall system architecture.

3. Implementation and unit testing

   During this stage, the system is realized as a set of programs or units. Unit testing involves verifying that each unit meets its specification.

4. Integration and system testing

   The individual units are integrated and tested as a complete system to ensure that the requirements have been met. After testing, the system is delivered to the customer.

5. Operation and maintenance

   The system is installed and run. Errors which were not discovered in earlier stages of the life cycle are corrected, thus improving the system.

Each stage overlap and they feed information to each other. This process is not a linear model, but involves a sequence of iterations of the development activities. After a small amount of iterations, each development stage is "signed off" and continue with the later development stages.

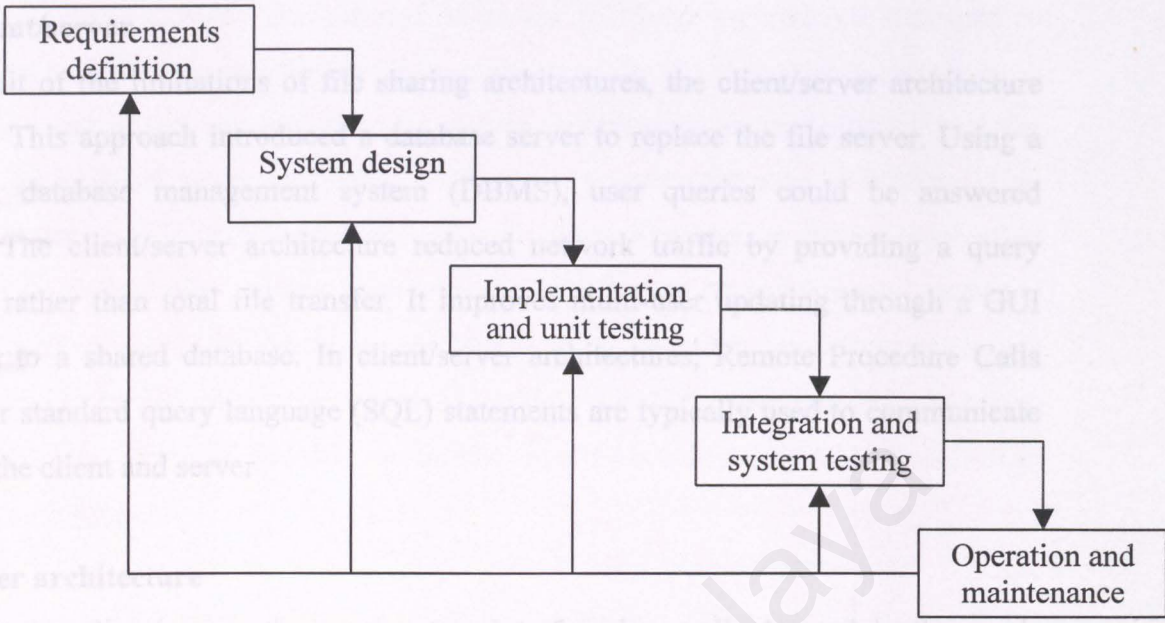


Figure 2 The system life cycle

3.4 Database

Data Access Model

- ODBC

ODBC is an Application Programming Interface (API) for database access. Besides being one of the most popular database interface used for application today, ODBC has gained status as the formal call-level interface standard by ANSI and ISO. It communicates directly with relational database and supports application or components that are written to use ODBC or data object interface that use ODBC. ODBC is designed to work with relational database (such as those in SQL server) only although there are limited ODBC drivers available for some non-relational data sources. The most common limitation is that ODBC is designed to use on a Microsoft platform only.

3.5 Web Architecture

3.5.1 Client/server

As a result of the limitations of file sharing architectures, the client/server architecture emerged. This approach introduced a database server to replace the file server. Using a relational database management system (DBMS), user queries could be answered directly. The client/server architecture reduced network traffic by providing a query response rather than total file transfer. It improves multi-user updating through a GUI front end to a shared database. In client/server architectures, Remote Procedure Calls (RPCs) or standard query language (SQL) statements are typically used to communicate between the client and server

3.5.2 2-tier architecture

With two tier client/server, the user system interface is usually located in the user's desktop environment and the database management services are usually in a server that is a more powerful machine that services many clients. Processing management is split between the user system interface environment and the database management server environment. The database management server provides stored procedures and triggers.

There are a number of software vendors that provide tools to simplify development of applications for the two tier client/server The two tier client/server architecture is a good solution for distributed computing when work groups are defined as a dozen to 100 people interacting on a LAN simultaneously. It does have a number of limitations. When the number of users exceeds 100, performance begins to deteriorate. This limitation is a result of the server maintaining a connection via "keep-alive" messages with each client, even when no work is being done. A second limitation of the two tier architecture is that implementation of processing management services using vendor proprietary database procedures restricts flexibility and choice of DBMS for applications. Finally, current implementations of the two tier architecture provide limited flexibility in moving (repartitioning) program functionality from one server to another without manually regenerating procedural code.

3.5.3 3-tier architecture

The three tier architecture (also referred to as the multi-tier architecture) emerged to overcome the limitations of the two tier architecture. In the three tier architecture, a middle tier was added between the user system interface client environment and the database management server environment. There are a variety of ways of implementing this middle tier, such as transaction processing monitors, message servers, or application servers. The middle tier can perform queuing, application execution, and database staging. For example, if the middle tier provides queuing, the client can deliver its request to the middle layer and disengage because the middle tier will access the data and return the answer to the client. In addition the middle layer adds scheduling and prioritization for work in progress.

The three tier client/server architecture has been shown to improve performance for groups with a large number of users (in the thousands) and improves flexibility when compared to the two tier approach. Flexibility in partitioning can be a simple as "dragging and dropping" application code modules onto different computers in some three tier architectures. A limitation with three tier architectures is that the development environment is reportedly more difficult to use than the visually-oriented development of two tier applications.

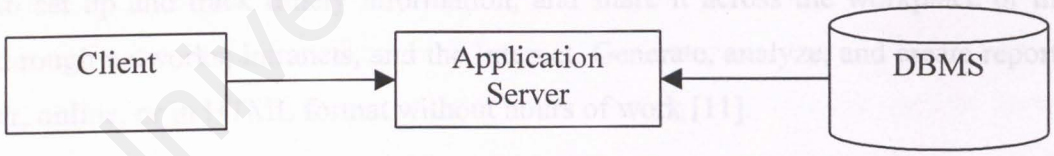


Figure 3 3-tier architecture

For this system, I will use the 3-tier or also known as multi tier architecture to develop this system. The client will be the users and the DBMS is Microsoft Access. The application server is Microsoft Personal Web Server. 3-Tier client-server architecture is chosen because the distributed computing environment is separated into presentation, functionality, and data components, such that there is a well-defined interface between

each component, and the software used to implement each component can be replaced easily. This is needed in order to provide a flexible, extensible architecture with a manageable environment, and to facilitate rapid development of robust applications. It also reduces the burden of distributing large client software and providing sufficiently powerful client platforms (as in a 2-tier client/server environment.)

3.6 Operating System Used

Windows 98

Windows 98 offers support for a number of new technologies, including FAT32, AGP, MMX,USB, DVD, and ACPI. Its most visible feature, though, is the *Active Desktop,* which integrates the Web browser (Internet Explorer) with the operating system. From the user's point of view, there is no difference between accessing a document residing locally on the user's hard disk or on a web server halfway around the world [10].

3.7 Database Used

Microsoft Access

Microsoft Access 2000 makes it easy to get the information you need and provides powerful tools that help you organize and share your database so you and your team make better decisions. From home businesses to corporations, Microsoft® Access 2000 is the scalable relational database that grows as a business grows. New features make it easier to set up and track timely information, and share it across the workplace or the world through networks, intranets, and the Internet. Generate, analyze, and create reports on paper, online, or in HTML format without hours of work [11].

3.8 Web Server Used

Microsoft Personal Web Server

I will use the Personal Web Server as the application server. This server is integrated with Microsoft Frontpage 2000.

3.9 Web Programming Language Used

JavaScript

JavaScript is an object based language with strong support for proper software engineering techniques. We can create and manipulate objects. JavaScript makes World Wide Web pages "come alive". JavaScript is a powerful client-side scripting language. JavaScript is Netscape's cross-platform, object-based scripting language for client and server applications. JavaScript lets you create applications that run over the Internet. Client applications run in a browser, such as Netscape Communicator, and server applications run on a server, such as Netscape Enterprise Server. Using JavaScript, you can create dynamic HTML pages that process user input and maintain persistent data using special objects, files, and relational databases. Through JavaScript's LiveConnect functionality, your applications can access Java and CORBA distributed-object applications [12].

Active Server Pages (ASP)

ASP is a server-side scripting language. Server-side scripting uses information sent by clients, information stored in server's memory and information from the Internet to dynamically create Web pages. When a server receives a client's HTTP request, the server loads the document (or page) requested by the client. HTML documents are *static documents* – all clients see the same content when requesting an HTML document. ASP is a Microsoft technology for sending to the client dynamic Web content – which includes HTML, Dynamic HTML, ActiveX controls, client-side scripts and Java applets (i.e., client-side Java programs that are embedded in a Web page). The Active Server Page processes the request (which often includes interacting with a database), and returns the results to the client – normally in the form of an HTML document, but other data formats (e.g., images) can be returned [1]. For this system I will use ASP to create the "Add to shopping cart" feature.

3.10 Hardware Requirements

3.10.1 Design time environment

Processor	Pentium II 266 MHz or higher and other x86 compatible processors like Intel, AMD
RAM	Minimum is 64MB and just enough for a small database to run and to test out the web application. Bigger is better when database is put into production for running multiple service
Hard disk	Minimum is 2.5GB
Others	Keyboard, mouse, monitor, SVGA card, sound card, network card, etc

3.10.2 Run time environment

Processor	Intel Pentium 100MHz
RAM	Minimum 32MB
Hard disk	Minimum 50MB disk space
Modem/internet connection	Minimum of 28.8kbps
Others	Keyboard, mouse, monitor, SVGA card, sound card, network card, etc

3.11 Software Requirements

3.11.1 Design time environment

Operating System	Windows 98
Database	Microsoft Access
Web server	Microsoft Personal Web Server
Web browser	Microsoft Internet Explorer
Development tools	ASP, JavaScript, XML
Text	HTML

3.11.2 Run time environment

Operating system	Windows 98
Database	Microsoft Access
Web server	Microsoft Personal Web Server
Web browser	Microsoft Internet Explorer
Development tools	ASP, JavaScript, XML
Text	HTML

CHAPTER 4 SYSTEM DESIGN

In this chapter, the system design will be covered from the view of the property search module, user functions module, information module, the career module and the system's database. It will include the design's in terms of the flow charts, processes and entities with relevant descriptions. Sample of the homepage GUI will be included.

4.1 System architecture

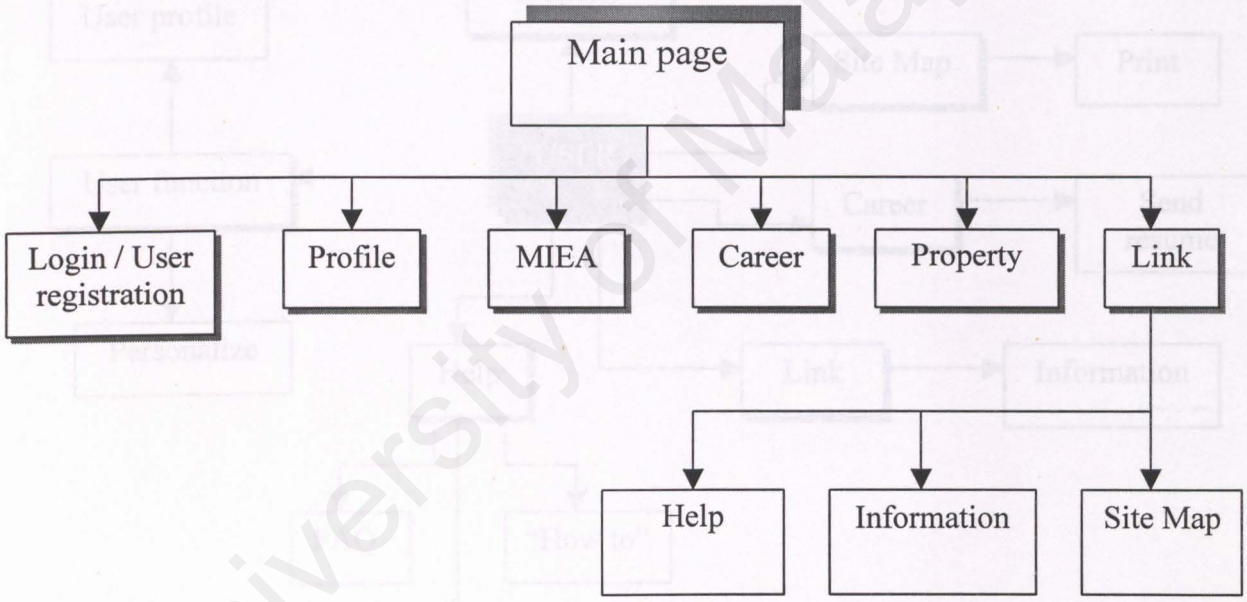


Figure 4 System design for Idaman Realty

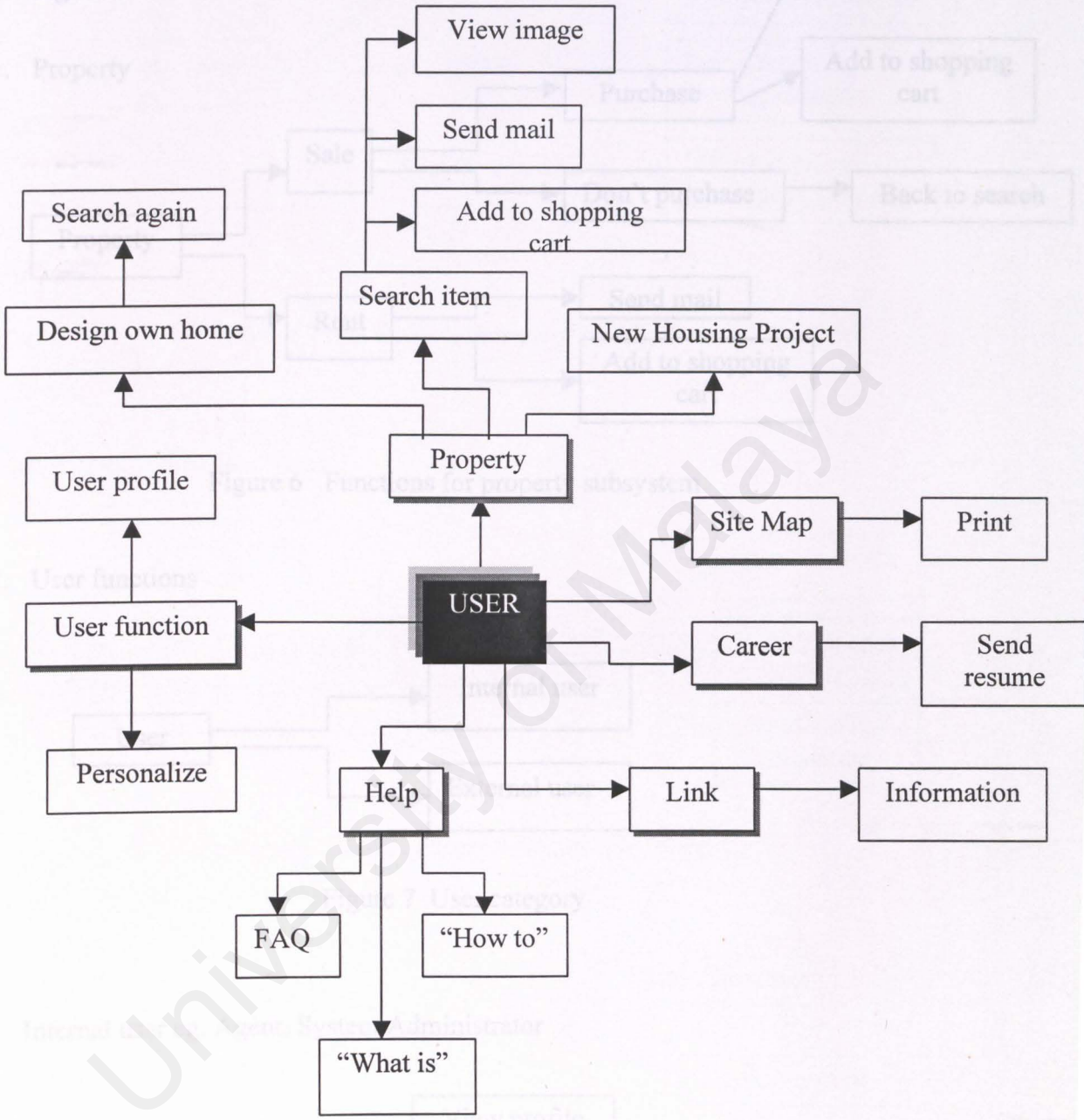


Figure 5 User functions available in the system

4.2 Subsystems design

4.2.1 Diagrams

1. Property

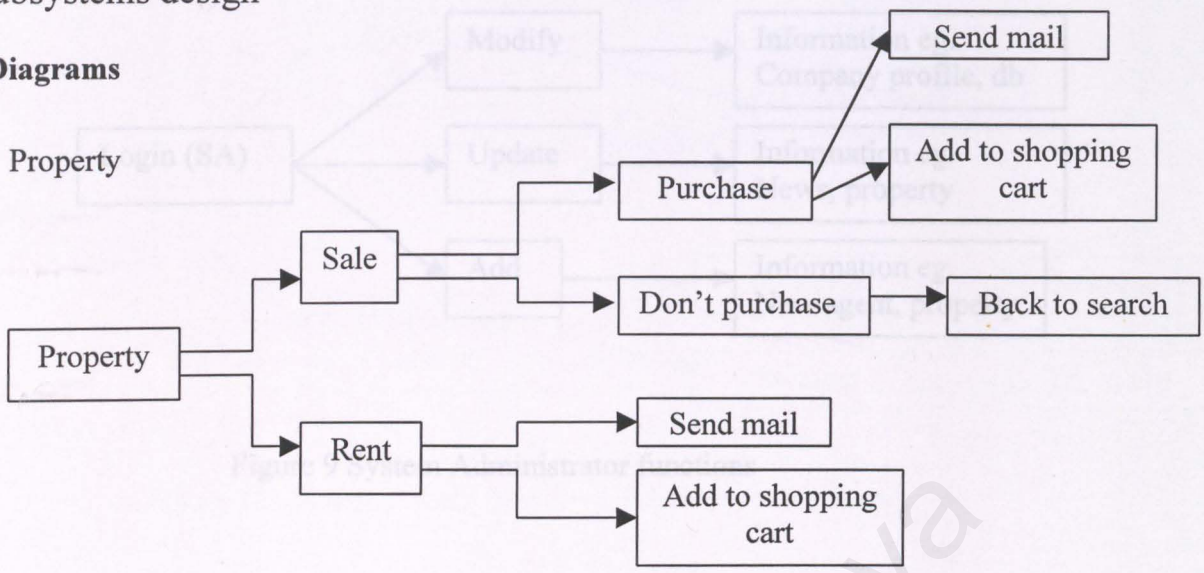


Figure 6 Functions for property subsystem

2. User functions

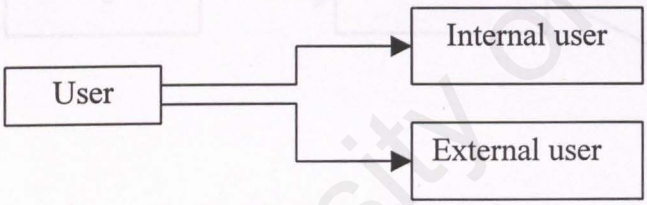


Figure 7 User category

Internal user eg. Agent, System Administrator

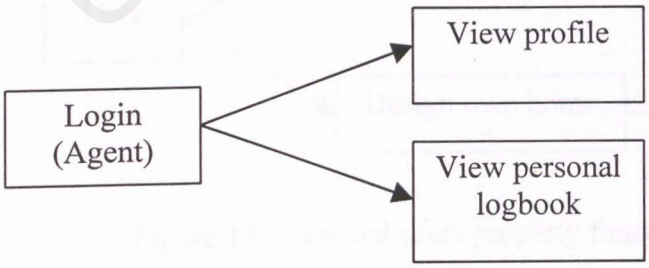


Figure 8 Agent functions

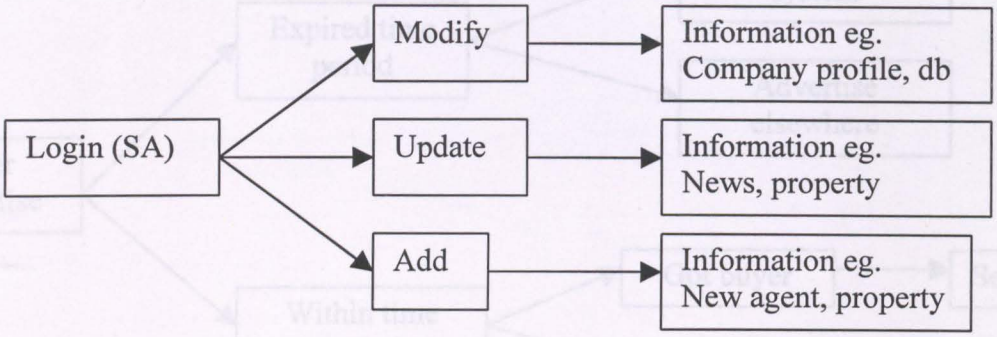


Figure 9 System Administrator functions

External user eg. property seekers

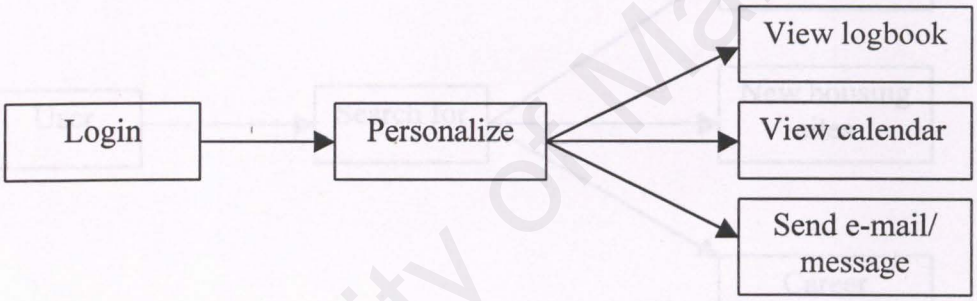


Figure 10 External users function subsystem

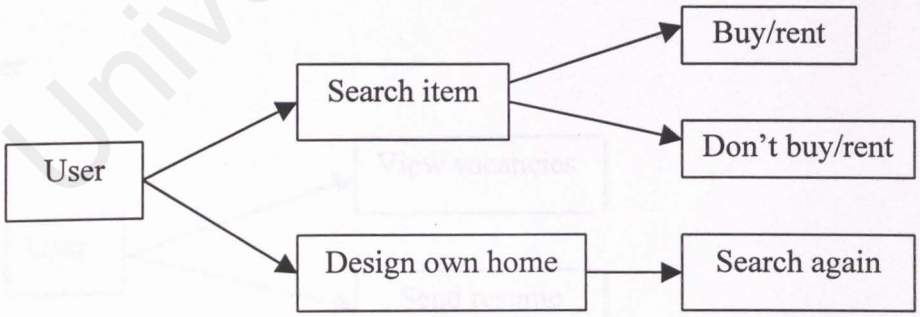


Figure 11 External users property function subsystem

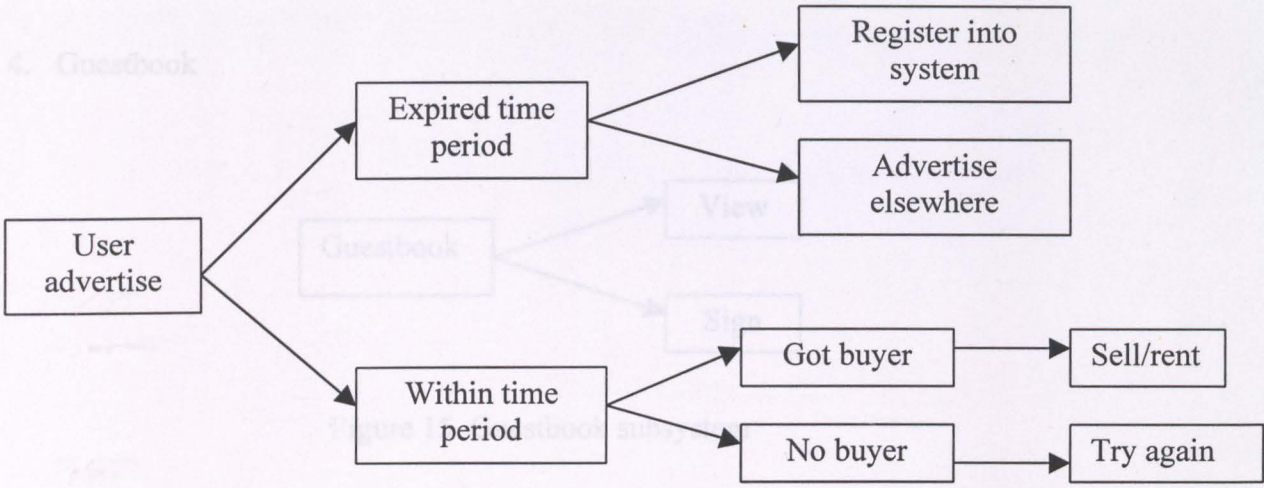


Figure 12 External users property advertising subsystem

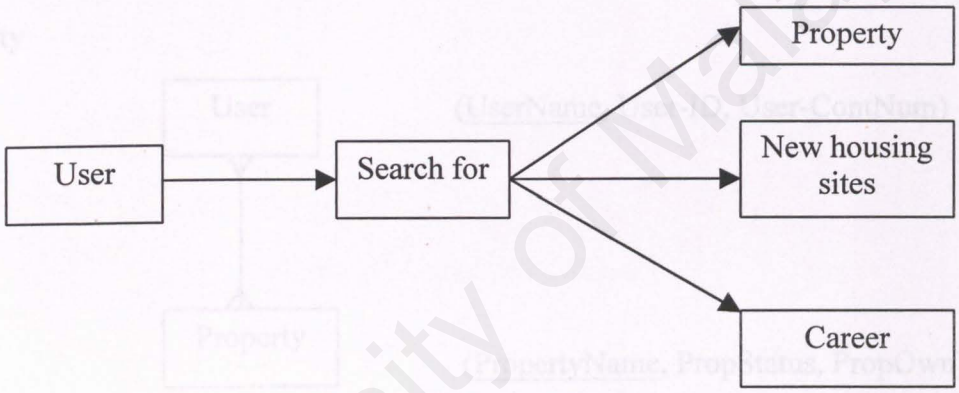


Figure 13 Search options

3. Career

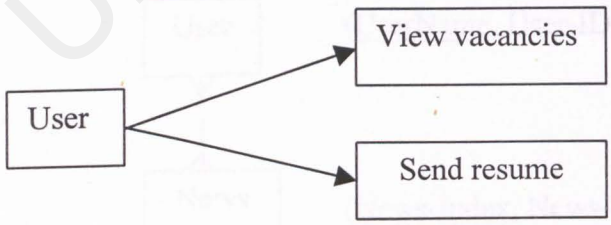


Figure 14 Career subsystem

4. Guestbook

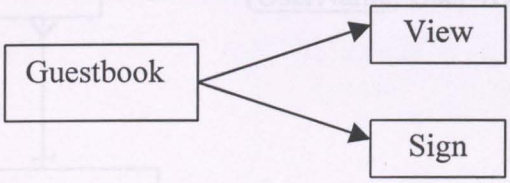
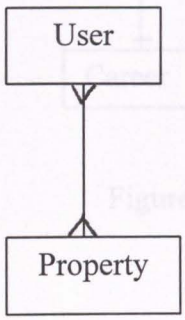


Figure 15 Guestbook subsystem

4.2.2 ER Diagram

1. Property

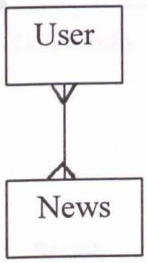


(UserName, User-ID, User-ContNum)

(PropertyName, PropStatus, PropOwn)

Figure 16 Property ER Diagram

2. Link - News



(UserName, User-ID, User-ContNum)

(News-Index, News-Title, News-Desc)

Figure 17 News ER Diagram

3. Guestbook

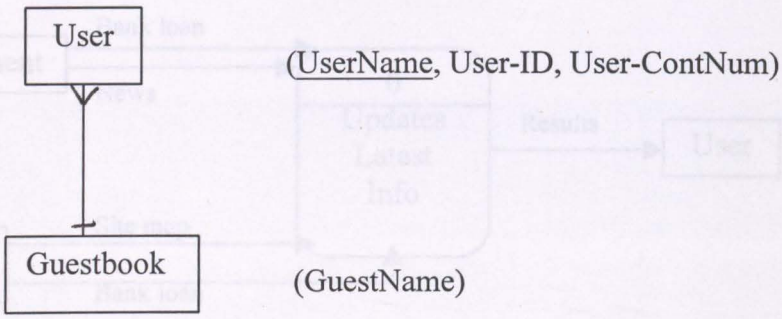


Figure 18 Guestbook ER Diagram

4. Career

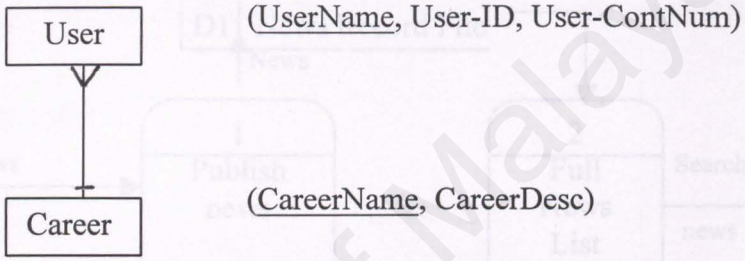


Figure 19 Career ER Diagram

4.2.3 Data Flow Diagram

1. Property

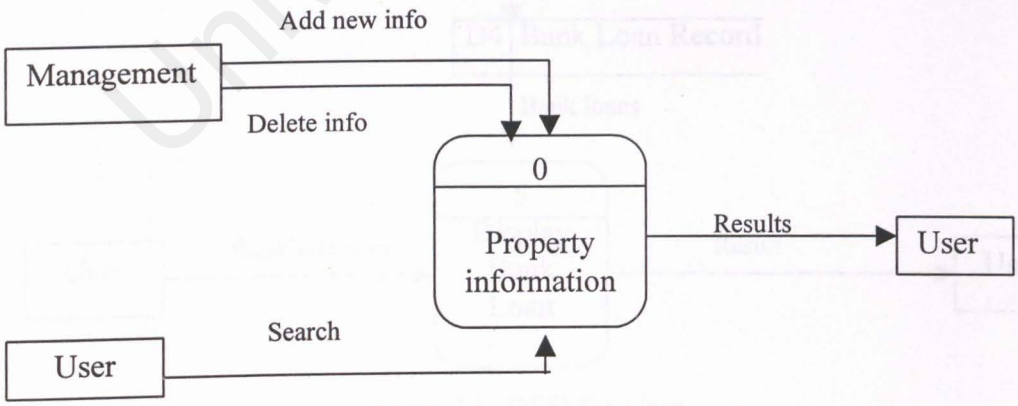


Figure 20 DFD for Property

2. Link-News

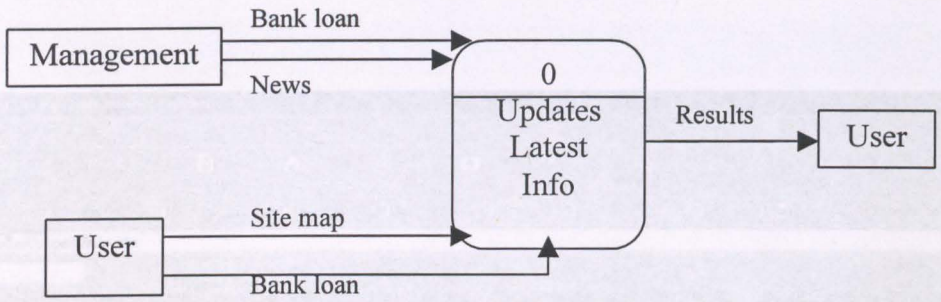


Figure 21 DFD for News

3. User

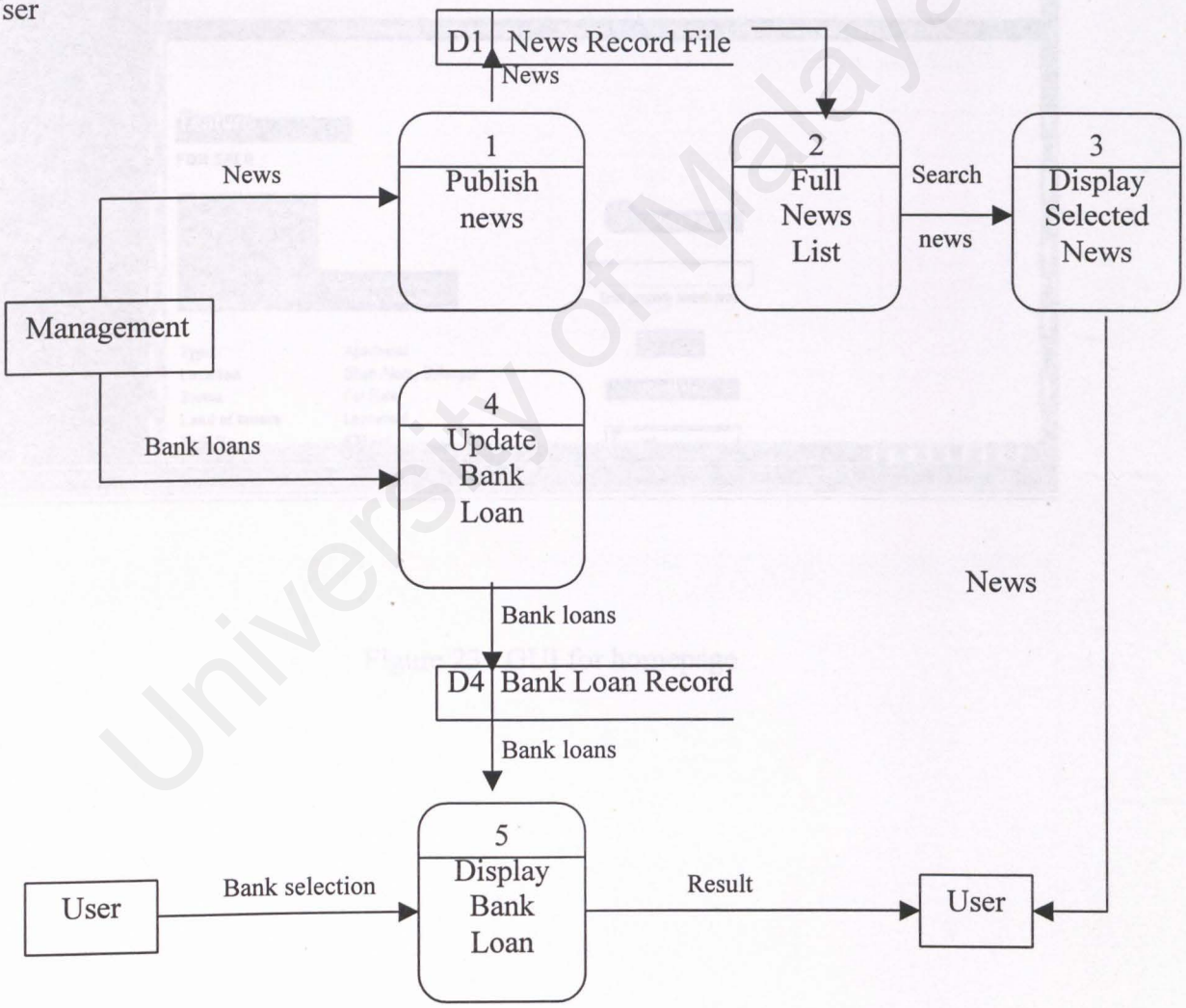


Figure 22 DFD for User

4.2.4 Graphical Use Interface

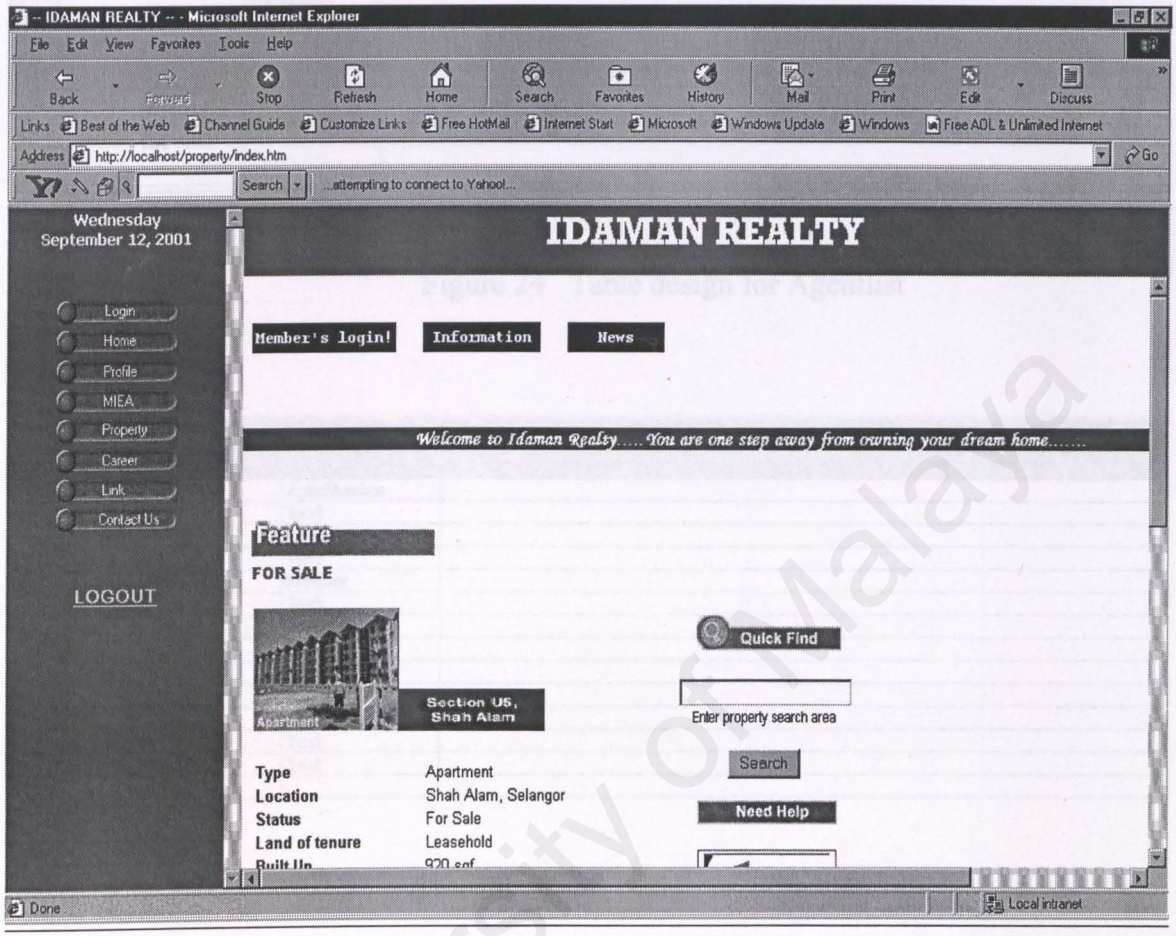


Figure 23 GUI for homepage

4.2.5 Database Table Design

Agentlist : Table

Field Name	Data Type	Description
ID	AutoNumber	
agentID	Text	
propertyID	Text	

Figure 24 Table design for Agentlist

AgentsProfile : Table

Field Name	Data Type	Description
AddressID	AutoNumber	
Name	Text	
Other name	Text	
Address	Text	
Postcode	Number	
City	Text	
State	Text	
Country	Text	
Telephone	Text	
Fax	Text	
Email	Text	
Homepage	Text	
Sex	Text	

Figure 25 Table design for AgentsProfile

Property_OLD : Table

Field Name	Data Type	Description
propertyID	AutoNumber	
agentID	Text	Agent assigned
date	Date/Time	Listing date
pr_name	Text	Name
pr_type	Text	Type
pr_location	Text	Location
pr_addr	Text	Address
pr_city	Text	City
pr_state	Text	State/Province
pr_country	Text	Country
pr_status	Text	Selling/Rent
pr_startingprice	Currency	Price
pr_builtup	Number	Builtup/Land Area
pr_details	Text	Details
pr_amenities	Text	Amenities/Facilities
remarks	Text	Sold/Rented

Figure 26 Table design for Property

Job_opp : Table

Field Name	Data Type	Description
Name	Text	
Ic_No	Text	
Sex	Text	
Age	Number	
Tel_No	Text	
EMail	Text	
Address	Text	
Education	Memo	
Work_Exp	Memo	
Others	Memo	

Figure 27 Table design for Job_opp

CHAPTER 5 IMPLEMENTATION

This chapter will deal with the realization of the system design as illustrated in the previous chapters into an executable application. The paper model of the system was transformed into a form understood by the computer through the implementation phase, which involves extensive code writing in script languages recognizable. Testing was held at the later stage of system implementation to locate errors. The entire system is then integrated and integration testing is done before the system is verified to serve its purpose.

5.1 Program Development & Coding

Program development is the process of creating the programs needed to satisfy an information systems requirement. Development and coding is the phase which takes the longest time in the development cycle. Thus, using the right tool and the right way to develop the system is crucial in determining the success of a project. For Idaman Realty, this involves developing the system using different programming languages from JavaScript, Vbscript, Active Server Pages (ASP) and Hyper Text Markup Language (HTML). Before starting on coding or any other detailed work on programming, a review of the system documentation needs to be done, followed by the design of the programs and finally the program coding process.

5.1.1 Review of the system documentation

Firstly, the systems documentation that was prepared during earlier phases has to be reviewed. The documentation prepared in system design phase consists of architectural view, concepts and controls, module flow diagram and a sample layout of interface. The documentation provides a guide and an understanding of the work that needs to be done in the coding process.

5.1.2 Design of Program

After the reviewing process, designing of the program is the next phase. For this phase, determining how the program can accomplish the features and functions that are

described in the program documentation and developing a logical solution to the program problem is done. This system has been designed using Microsoft Frontpage 2000. The web pages created have all been done dynamically by using frames and tables to ease the display of information. Users will be able to navigate through the system by choosing the appropriate hyperlinks or clicking on the menu buttons on the left frame. When an invalid hyperlink is clicked, appropriate error messages are displayed and users can easily go back tot previous screen.

5.1.3 Coding of the Program

The coding technique used in developing the system is a stepwise refinement approach. This is essential for developing a well-structured program. VBscript is written to render dynamic functions so that an image can be dynamically linked, just by a click of a button. JavaScript is also used in rendering the date format in the web pages.

5.1.4 Testing of the Program

Once the coding has been done for each module, testing is done to make sure all is running well and the information is displayed correctly. Each module's code are rechecked if there is any error and correction is done accordingly. Once all the modules are running well, the system is tested as a whole to detect if all modules connect properly. If there is an error, then we will go back to the coding of the program to check where is the error. After the error has been rectified, the program is retested again.

5.1.5 Documentation of the Program

Documentation of the program is done simultaneously when the program is designed and tested. This will enable the system to identify the errors and it can be noted down and appropriate correction can be done.

5.1.6 Program Coding

- **Coding Approach**

The coding methodology used began with the design of the user interface for each page. The left frame consists of all the functions, was first created followed by the body of the

entire system. For speed and efficiency, Microsoft Frontpage 2000 was used as this software offered developers ease-of-use and ease-of-learning. After initial design of user interface, scripting process began. Programming scripts written using JavaScript, Vbscript, HTML and ASP were used.

Below is the list and description of important features of system's engine. These features are achieved by programming languages and scripts.

Data presentation

HTML

Coding in HTML is one of the important processes in developing and coding phase. For this Microsoft Frontpage 2000 is used. Frontpage is used to create dynamic web pages by embedding JavaScript tags in the HTML file.

JavaScript

Coding in JavaScript is also another important process in the coding phase, as it is used for validating login scripts and displaying the date formats.

Forms and Data Validation

The system is made up of forms used for data input and data searching. The process may be simple as displaying the data to users or as complicated. For example, the member's login page allows new users to sign up or existing users like agents to view the tasks assigned to them. Data validation is performed for checking password entered to ensure that there is no unauthorized persons logging into the system. When invalid or incorrect data is detected, pop-up menus bearing appropriate and helpful messages appear to alert the user of the errors. Client-side scripting language JavaScript was used to perform the data validation function. JavaScript function are embedded in the web pages and invoked at the submission of a form.

- **Coding Style**

Coding style is an important attribute of the source code. An easy to read source code makes the system easier to maintain and enhance. Elements that are taken into consideration while coding are internal documentation, standard naming convention and standard graphical user interface (GUI).

Internal documentation is achieved by using comments while coding, which provide a clear guide to programmers for future enhancement. Statements of purpose indicating the functions of modules and descriptive comments are embedded into the source code to describe processing function. Standard naming convention and standard usage of graphical user interface components is employed in developing the system. Standard naming convention provides programmers with easy identification of variables. While a standard graphical user interface component provides users an environment that will not generate much surprise to them.

Below is an example of source code that shows comments for identifying the functions :

```
<script language="JavaScript">
<!-- Begin
// day
var days = new Array(8);
days[1] = "Sunday";
days[2] = "Monday";
days[3] = "Tuesday";
days[4] = "Wednesday";
days[5] = "Thursday";
days[6] = "Friday";
days[7] = "Saturday";

//month
var months=new Array(13);
months[1]="January";
months[2]="February";
months[3]="March";
months[4]="April";
months[5]="May";
months[6]="June";
months[7]="July";
months[8]="August";
months[9]="September";
```

```
months[10]="October";
months[11]="November";
months[12]="December";

//date
var time=new Date();
var weekday=days [time.getDay() + 1];
var lmonth=months[time.getMonth() + 1];
var date=time.getDate();
var year=time.getYear();

if (year < 2000)
year = year + 1900;
document.write(weekday + "<br>" );
document.write(lmonth + " " + date + ", " + year);
// End -->
</script>
```

5.1.7 Database Connection

ODBC is an Application Programming Interface (API) for database access. It communicates directly with relational database and supports application or components that are written to use ODBC or data object interface that use ODBC. Through an ODBC connection, data from the database in Access can be displayed by creating a Data Source Name (DSN). This will enable the information from relational database tables to be displayed as when requested.

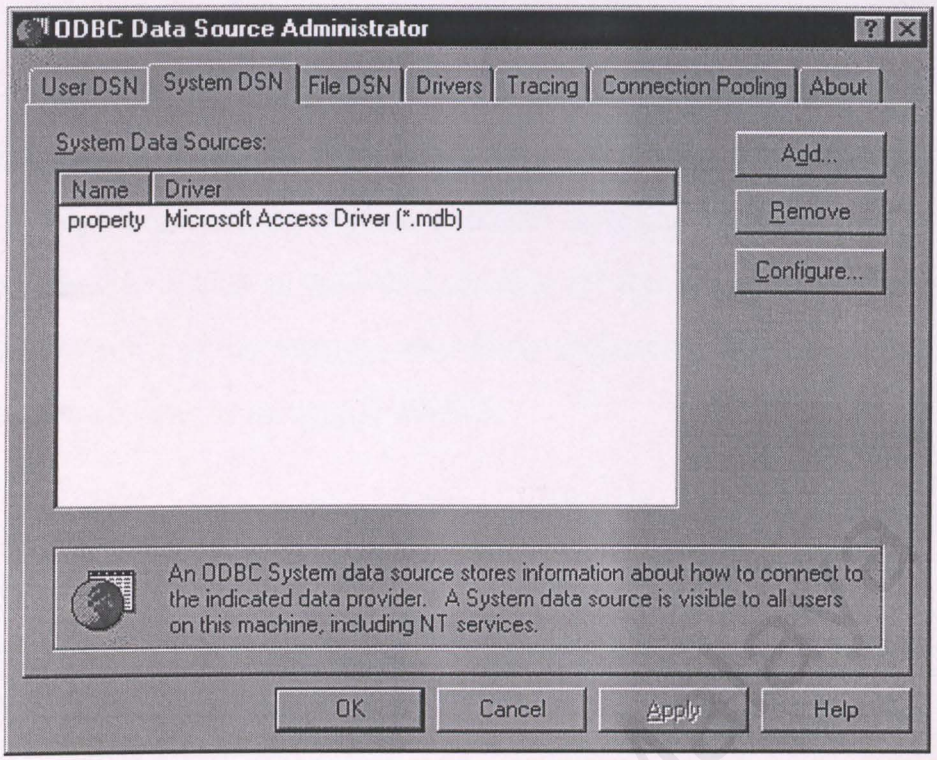


Figure 28 ODBC Data Source Administrator Window

CHAPTER 6 TESTING

In this chapter, the system will be tested as a unit, then followed by as a system once all the units are integrated. This will enable error detection and correction can be done. The system consists of many modules, which need to be integrated to perform well and display all the information needed by users. System integration testing also tests the conformance of the entire system to its non-functional requirements.

6.1 System Testing

6.1.1 Testing Strategies

Testing was done throughout the system development and not just at the end. All the system's newly written or modified application programs, as well as procedural manuals, hardware and system integration are tested thoroughly.

6.2 Stages of Testing

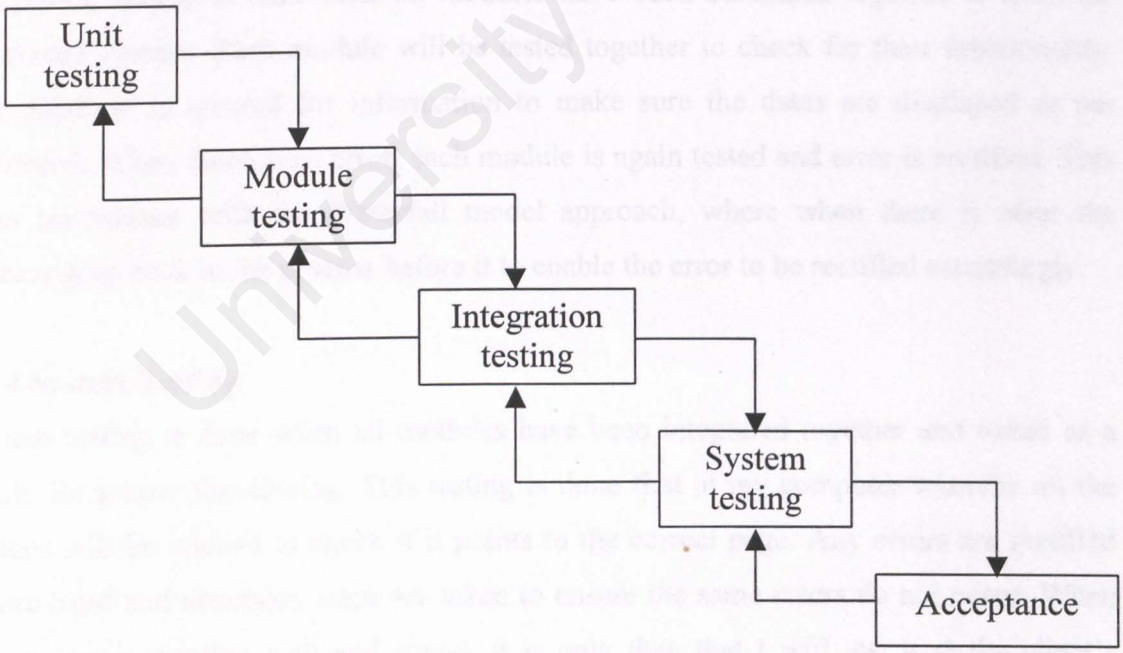


Figure 29 Testing Stages

6.2.1 Unit Testing

Unit testing is done after each unit is designed and created. For example, in the property module, there are search and display unit. The display unit will display all the properties in a selected are eg. Kuala Lumpur. Once this unit is functioning well, it can now be integrated into the property module.

6.2.2 Module Testing

Module testing is done after all units in one module is tested individually and then integrated together. For example, once the property data has been entered into the database, the search function is tested to make sure the data is retrieved from the tables in the database. This is then subsequently tested again to display a report of the data obtained. The tables in the database are also tested to have the right values or parameters. When there is an error detected or the proper search results are not displayed, the process goes back to the unit testing and the error is discovered. The error is then rectified and the unit is integrated back into the property module.

6.2.3 Integration Testing

Integration testing is done after all modules have been combined together to form the temporary system. Each module will be tested together to check for their functionality. The database is queried for information to make sure the datas are displayed as per requested. When there is an error, each module is again tested and error is rectified. This is in accordance with the Waterfall model approach, where when there is error the process goes back to the process before it to enable the error to be rectified accordingly.

6.2.4 System Testing

System testing is done when all modules have been integrated together and tested as a whole for proper functioning. This testing is done first at my computer whereby all the buttons will be clicked to check if it points to the correct page. Any errors are rectified before hand and necessary steps are taken to ensure the same errors do not occur. When the system is running well and sound, it is only then that I will test it at the client's (Idaman Realty) computer. The system will be running on one computer only for a

certain period of time, before migrating the new website design into the company's computers.

6.2.5 Acceptance

At this stage, the system will reveal any requirements problem when the system's facilities do not really meet the users need or the performance is unacceptable. When this happens, the process will return to system's testing and the codes will be examined again as well as the functionality of the system. Once alls functioning well, the system is now ready for delivery to the users.

6.3 User Testing

User testing is done when the system testing has been done. The system is tested by the user by going through all the modules. Comments and suggestions from the users are reviewed and used appropriately to improve the system. The users comments will also help to identify some of the systems weakness which could have been overlooked. Comments from user has been included in the Appendix.

6.4 Testing with live data and test data

All programs in the system are desk-checked, checked with test data and checked to make sure that all the modules work together with one another as planned.

6.4.1 Programming with test data

This is done to verify the way the system will work and to ensure the routine works as it is written. This is the followed by both valid and invalid data tests, which are datas that are run to see if the basic routines work and to detect errors. Test data includes inserting possible maximum and minimum values in specified fields and then the outputs are carefully verified.

6.4.2 Full system testing with test data

Next, the whole system is tested as a complete entity with test datas. Test data created for express purpose of testing the system objectives are used. This full system testing includes reaffirming the quality standards for system performance that were set up when initial system specification were made. Measures of error, timeliness, ease of use, understandable procedure manuals and others are done to determine whether the system does what it is supposed to do.

6.4.3 Testing with live data

Once testing with test data has been done, now testing with live data is done. Live data is data that have been successfully processed through the existing system. This will allow accurate comparison of the new system's output with what that is known to be correctly processed output, as well as a good feel of how actual data will be handled.

6.5 Analysis of test results

Once the test results are identified and noted, it is evaluated to ensure it does not occur again. The errors are identified and written down as a bug list. Any error detected by client is also written down in the bug list for future improvements to be made to the system.

CHAPTER 7 EVALUATION & CONCLUSION

This chapter evaluates whether the system fulfills its objectives and purpose, as well as describing the system's strengths and limitation. The problems that have been faced in developing the system is also listed, followed by suggestions for future enhancement.

7.1 System Evaluation

7.1.1 Evaluation technique

Once the system has been designed, integrated and tested, an evaluation is done now. This is to check the functionality of the system and robustness of the system. Evaluation is also done to ensure that the system's objectives have been attained and the client is satisfied with the ready system now. The client will note down his/her dissatisfaction experienced while using the system and the necessary steps will be taken to rectify it. Any suggestion given by the client is also accepted and will be used in the future versions for improvement.

7.2 System Strength

7.2.1 User friendliness and consistency

The systems main plus factor is the user friendly GUI (graphical user interface). There are many windows, icons and a menu frame that helps users navigate easily through the system. The menus are all easy to use and the graphical interface use of mouse, icon and menu should be of common to the system. The system was created with public users in mind. Users may be first-timers or have no knowledge in computes and the Internet may be easily confused and lost. The system provides simple, but attractive interfaces that serve to be easy-to-use and learn. The system is easily navigated by the "point and click" feature. This system also maintains consistent interface through entire system, whereby the left frame which has the menu, helps the users to easily navigate through the system.

7.2.2 Fast response

There is also lack of heavy graphics used in the pages, which helps to accelerate loading page time. This results in faster access time and better productivity to the company.

7.2.3 Web content

The system also has a wide area of information about real estate business. It provides comprehensive information that assists potential buyers to make decision concerning their real estate. There are guidelines for homebuyers from the Ministry of Housing and Local Government, real estate terminology and a glossary among others.

7.2.4 Accessibility and ease of use

The system is easily accessed to from any computer running Windows 98. The system is loaded into the local company intranet and agents can log in to system to update whatever information. This is to ensure smooth operation at all times and the company can manage their assets well. External users will also be able to view the system in future once the client has a URL of its own. Currently it will be run only within the company.

7.2.5 Error messaging

The system is also user friendly in terms of error messaging. When a wrong input is given, appropriate dialog boxes appear to inform users of the error. This can then be easily rectified by entering the correct data.

7.3 System Limitation

7.3.1 Areas not covered by the system

Although the system provides information on real estate, it is just a macroview of the real estate industry and properties. It does not provide details such as details of neighborhood and legal procedures.

7.3.2 Browser

Another limitation is that the system can only be viewed from a browser running Internet Explorer. This is because Netscape browsers do not support scripts by Microsoft such as Vbscript and JavaScript, which have been embedded in the web pages.

7.3.3 Unavailability of bilingual feature

This system is designed using the English language and does not have features in other languages. Translation from English to Bahasa Malaysia is time consuming and due to time constraints, was not in incorporated into the design.

7.3.4 No SSL support in terms of security

To make this system a secured system that will convince users to make online payment, SSL (Secured Socket Layer) protocol that is the standard encryption and security protocol for Internet has to be incorporated into the system. Unfortunately, it will have to liase with a Certificate Authority (CA) to get a server digital certificate. The digital certificate has to be bought from the CA and other information like URL for the system and information of the company that runs the system has to be submitted together to purchase the certificate. It is nearly impossible to incorporate this type of function.

7.4 Future Enhancement

Due to time constraints, the system was not developed to cover all areas of real estate. Fortunately, the system was built to support additional modules or enhancement to its current modules. It will also see the part of limitations above being eliminated and improved.

7.4.1 Coding Enhancement

In the future, extensive codes will be used to make the system more dynamic and robust. XML can be used to display the document table as ADO (ActiveX Document Object) supports XML parsing. XML is a widely-supported, open-technology (i.e., non-proprietary) for data exchange [1]. Although XML and HTML are both subsets of

SGML, XML provides distinct advantages over HTML. HTML is a markup language for describing how content is rendered. XML is a markup language for describing structured data – content is separated from presentation. Because an XML document contains only data, applications decide how to display the data. Unlike HTML, XML permits document authors to create their own markup for virtually any type of information. Because XML tags describe the data they contain, it is possible to search, sort, manipulate and render an XML document using related technologies, such as Extensible Stylesheet Language (XSL). XML documents are highly portable.

7.4.2 More search criteria

In the future, more extensive search can be done as there will be more information available. Current system allows users to search properties according to state or location. As an addition, users will be able to search according to property name, lot size, built-up, number of rooms and so on.

7.4.3 User customization

User customization is what currently most service providers are providing their users with. Users can determine the contents of the site that they wish to have or member services that they wish to have. As user customization will involve complex and detailed planning to be done, it will be good and beneficial service to be provided to users.

7.4.4 Multimedia Properties

In the future, users will be able to view multimedia presentations or animated attributes in the displayed properties, which will provide more personalized experience for users.

7.4.5 System traffic report

This will serve the management as a maintenance tool. System traffic report such as number of hits per day, most visited page, most searched property type and many more will be available.

7.5 Problems encountered and solutions

7.5.1 Lack of knowledge in programming language

One of the main problem encountered is the lack of knowledge in programming language. This has been difficult as more extensive features could not be incorporated into the system due to my lack of knowledge in ASP programming. Grasping the concepts of a totally new programming language in a short period of time had to be done.

Solution : Have to get familiar with development tools and new programming languages, so that can be fully equipped to face problems. Discussions and exchanging of views with others who know the language can be done.

7.5.2 Problems in development tooling

The current system is running on a Windows platform and can be migrated to different platforms with sufficient development tools. The scripting language used limits browsing and access to computers running Internet Explorer browsers. Therefore, testing could not be done using other browsers like Netscape.

Solution : Different scripting tools should be used that can support any browser.

7.5.3 Difficulty in defining system scope

The current system was supposed to be a full scale complete system. But due to the time frame given, many functions could not be finished. This was also due to the variety of users and the business procedures that need to be fulfilled. Therefore, a system which contains most of the requirements were built.

Solution : More time is required so that extensive features can be added to the current system.

7.5.4 Difficulty in defining system scope to be developed

This is due to the fact that real estate business is very wide. I was also unfamiliar with the daily operations of a real estate agency, such as administration of personnel, business

transactions, property scope and many more. Therefore, there were many uncertainties as to what should be added and what should be excluded from the system.

Solution : The Internet is a great source of information. Many sites were referred to collect information that would help improve the system. These sites that were referred to, were analyzed for their functionalities and content to help decide on the scope for the system.

CONCLUSION

Until now, Idaman Realty has been performing business in the usual way of agents finding for clients and vice-versa. They have been maintaining a typical brick and mortar site for their business. With the advent of information technology and globalisation, IR would like to do business electronically and manage their resources well. This system has provided an opportunity for the company to step into the world of e-commerce. It helps the company eliminate problems encountered in traditional approach to real estate business.

With the targeted goals and objectives in mind even before the development takes place, makes the development process more systematic. But nevertheless, it also added to the difficulties of achieving those targets and objectives as they are drafted out and planned.

Anyway, I hope this system will benefit and satisfy Idaman Realty as well as other users.

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[2] http://www.miea.com.my

[3] http://propertyzoom.com

[4] http://www.metrohomes.com

[5] http://www.realtor.com

[6] http://www.century21st.com.au

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[8] Ian Sommerville, Software Engineering 5th edition, Addison-Wesley, England, 1995.

[9] http://www.webopedia.com

[10] http://www.microsoft.com

[11] http://www.developer.netscape.com/docs/mannuals/communicator/jsguide4/index.html (What is Javascript)

APPENDIX A - USER TESTING RESPONSE FORM

USER TESTING RESPONSE FORM

Name : Mr. M. Gopal Krishnan

Name of Company : Idaman Realty

Address : **(H)** 42, Jalan Yazid Ahmad, 70200 Seremban, Negeri Sembilan

(O) Suite 8-42, 8th Floor, Kompleks Mutiara, 3 ½ Mile, Jalan Ipoh, 51200 Kuala Lumpur

Telephone : **(H)** 06-7632717

(O) 03-62573734

(H/P) 013-3088661

Occupation : Real Estate Agent

Place of Testing : Idaman Realty

Date of Testing : 3/9/2001

Questions :

1. Has system achieved its objective ?	**YES**
2. Does the graphical user interface (GUI) of the system provide help in navigating through the system?	**YES**
3. Is the links provided in the menu point to the correct pages when clicked?	**YES**
4. Does the graphical user interface (GUI) of the system help you to understand and find what information you are looking for?	**YES**

5. Comments.

The system is clear and easy to understand. The search function is working well, but should be expanded to include the price of the property as one of the search criteria. More information such as an example of agreement letter can be included.

APPENDIX B - USER MANUAL

System Objective :

- To provide users information on the latest property available.
- To provide users information and news on the real estate business.
- To provide users a means of managing resources electronically.
- To provide users with a comprehensive guide to buying or renting a property.

Manual's Objective :

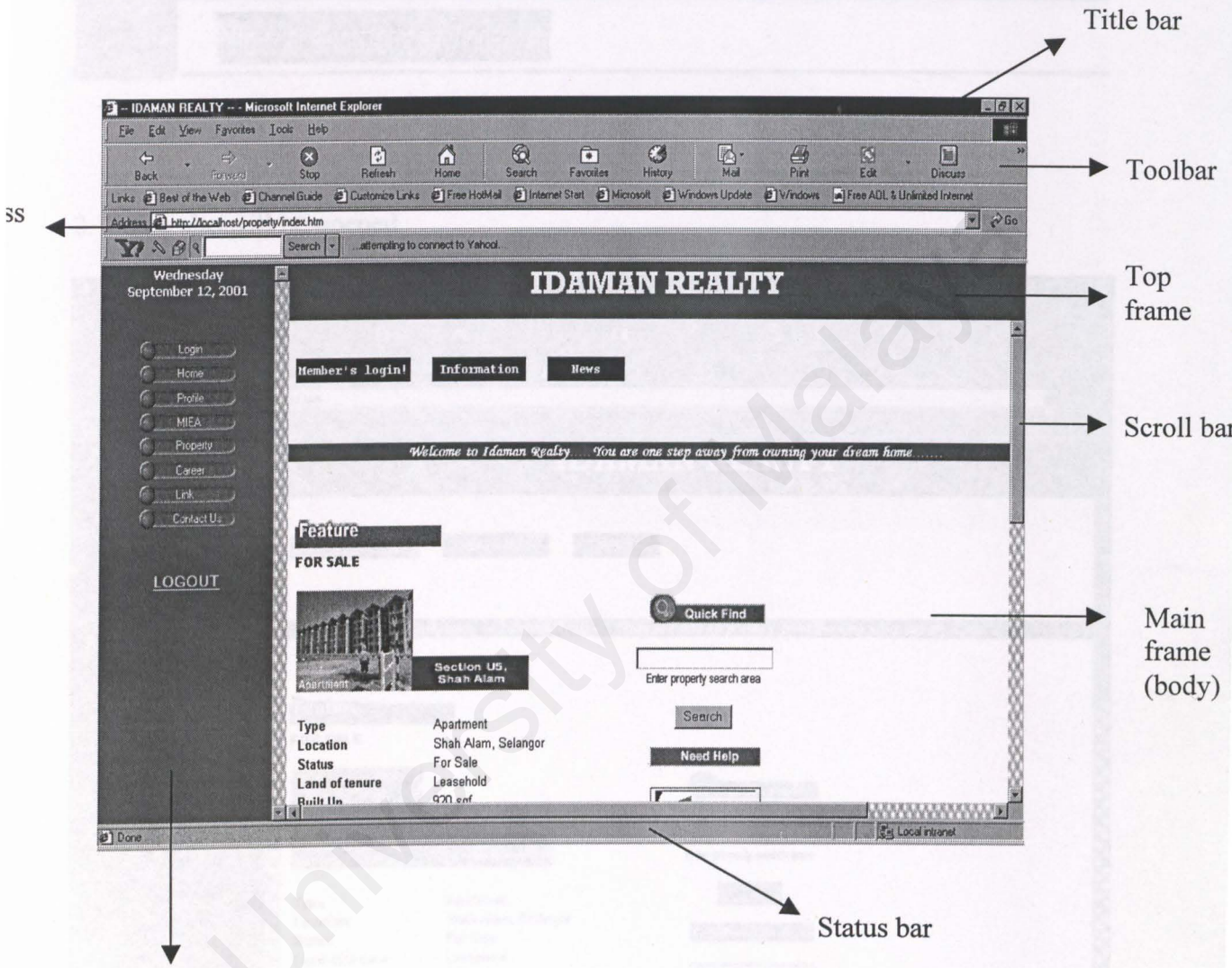
1. To provide users with a guide on how to use the system.
2. To provide users with a guide to navigating through the system and identifying the appropriate buttons.
3. To provide users with a written proof of the system's functions.

Hardware Requirements :

Processor	Intel Pentium 100MHz
RAM	Minimum 32MB
Hard disk	Minimum 50MB disk space
Modem/internet connection	Minimum of 28.8kbps
Others	Keyboard, mouse, monitor, SVGA card, sound card, network card, etc

Navigation :

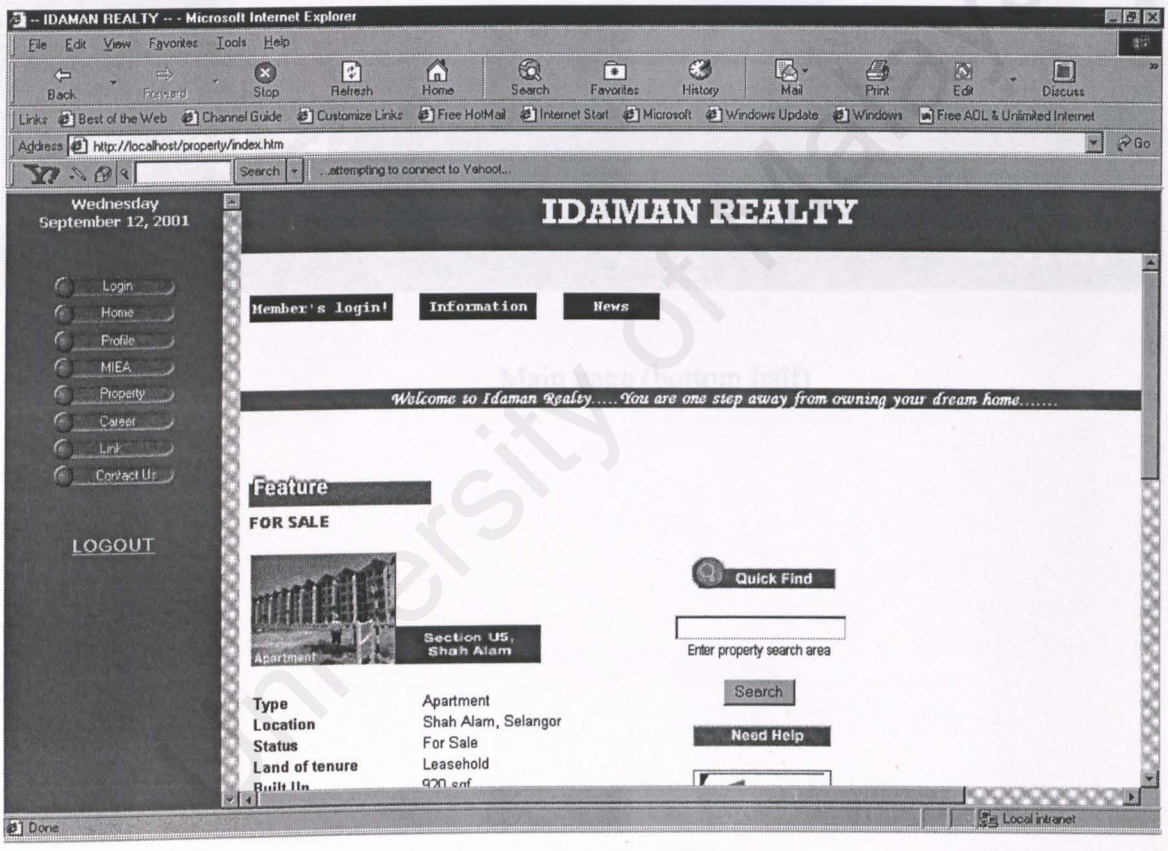
Main page



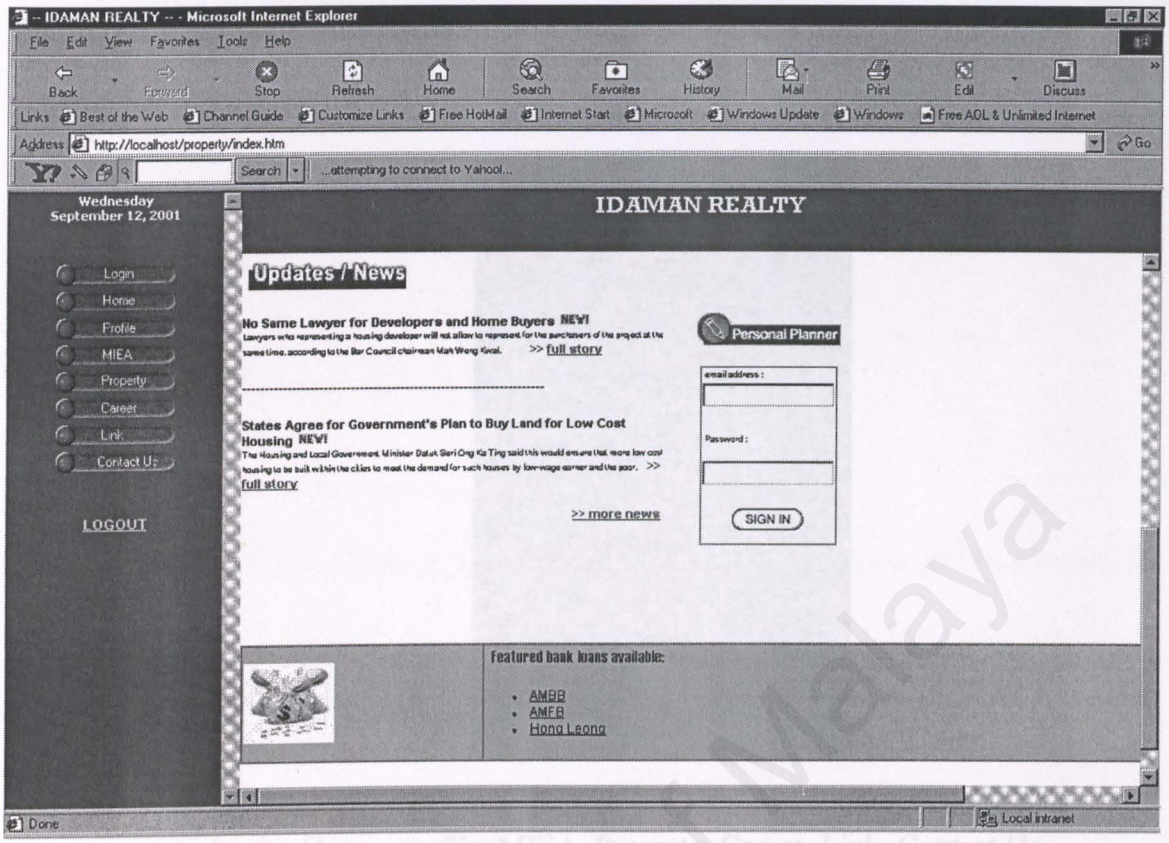
Opening Directory/Page

1. Type *http://localhost/property/index.htm* in the Address bar.

2. Web site will be opened.



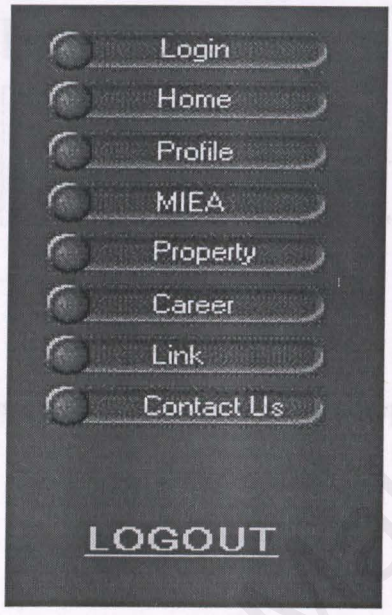
Main page (top half)



Main page (bottom half)

Identifying buttons and icons

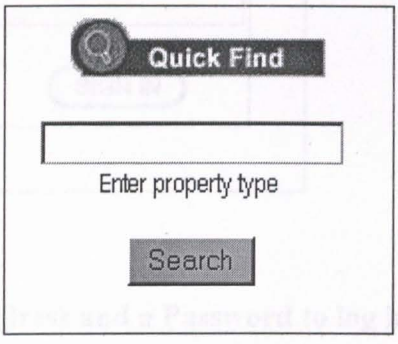
1. Menu bar (on the left frame)



Menu buttons : Login, Home, profile, MIEA, Property, Career, Link, Contact Us
Logout button : For logging out

Procedure : Click on any link or button to open the designated page.

2. Quick find button



Shortcut to do a quick search for property

Procedure : Fill in the text box and then click the Search button to return search results.

3. Need help button

Shortcut to send email to company : idamanrealty@hotmail.com

Procedure : Click on the Leave us a message button and a pop-up email window appears.

4. Personal Planner button

Shortcut to logging in

Procedure : Fill in your Email address and a Password to log in.

5. Member's login button

Shortcut to login page.

Procedure : Click on the Member's login button to go to login page.

6. Information button

Shortcut to information page.

Procedure : Click on Information button to go to the link page.

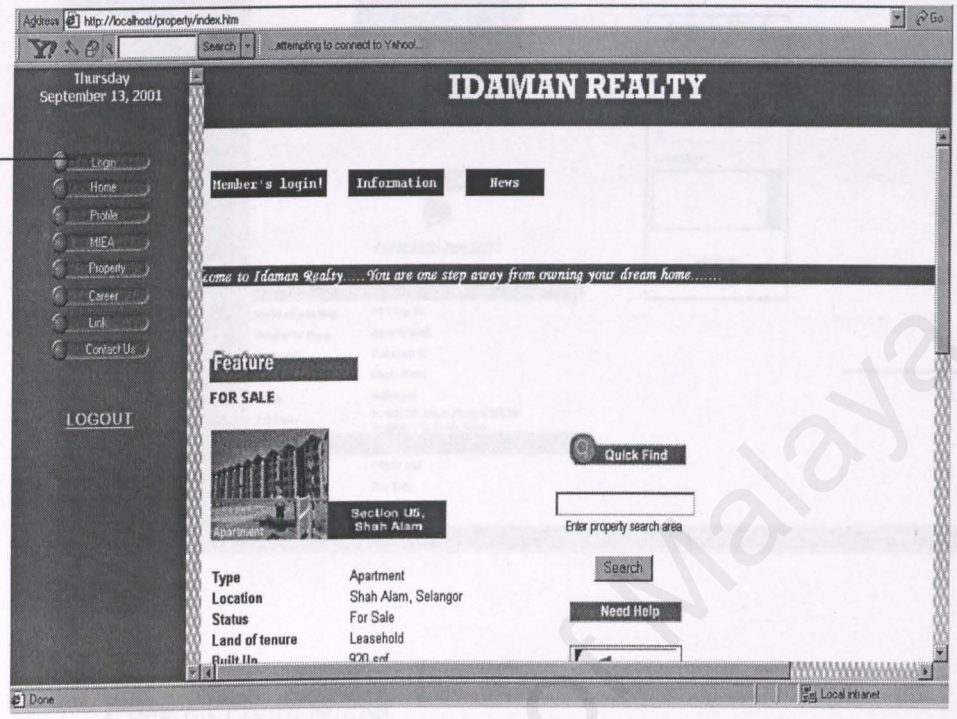
7. News button

Shortcut to news page.

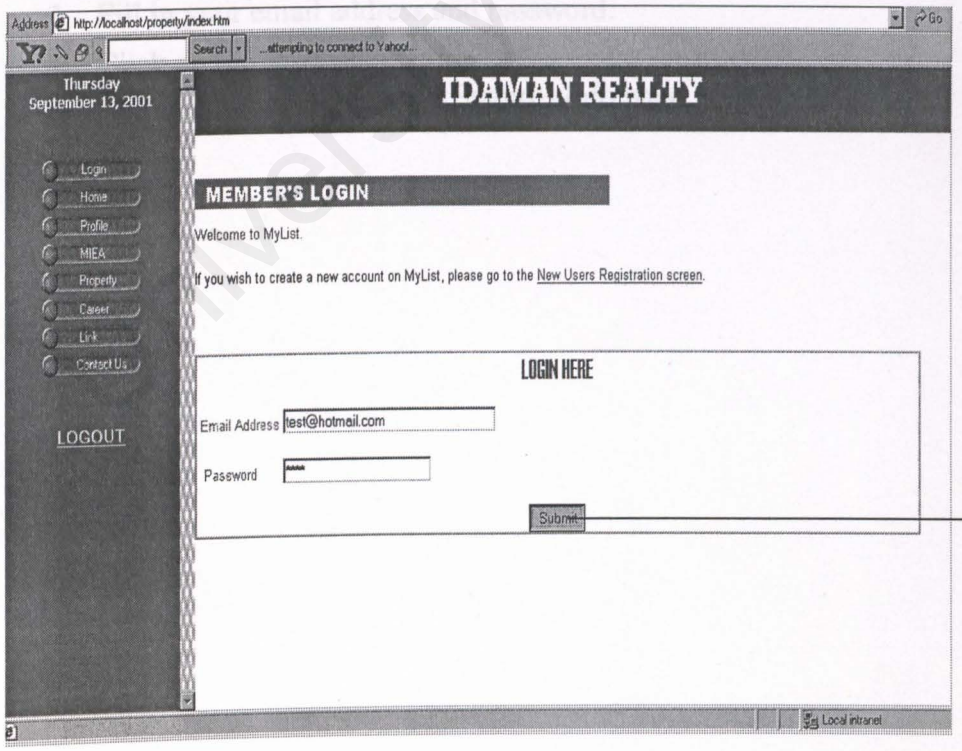
Procedure : Click on News button to go to news page.

Features

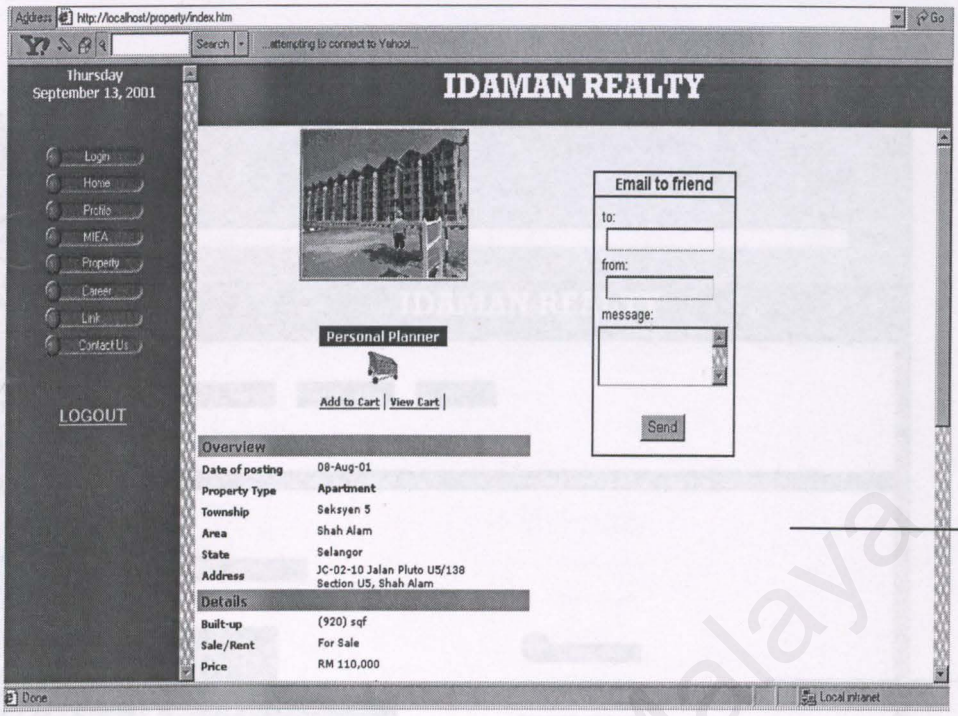
1. Login page



Login button



Submit button

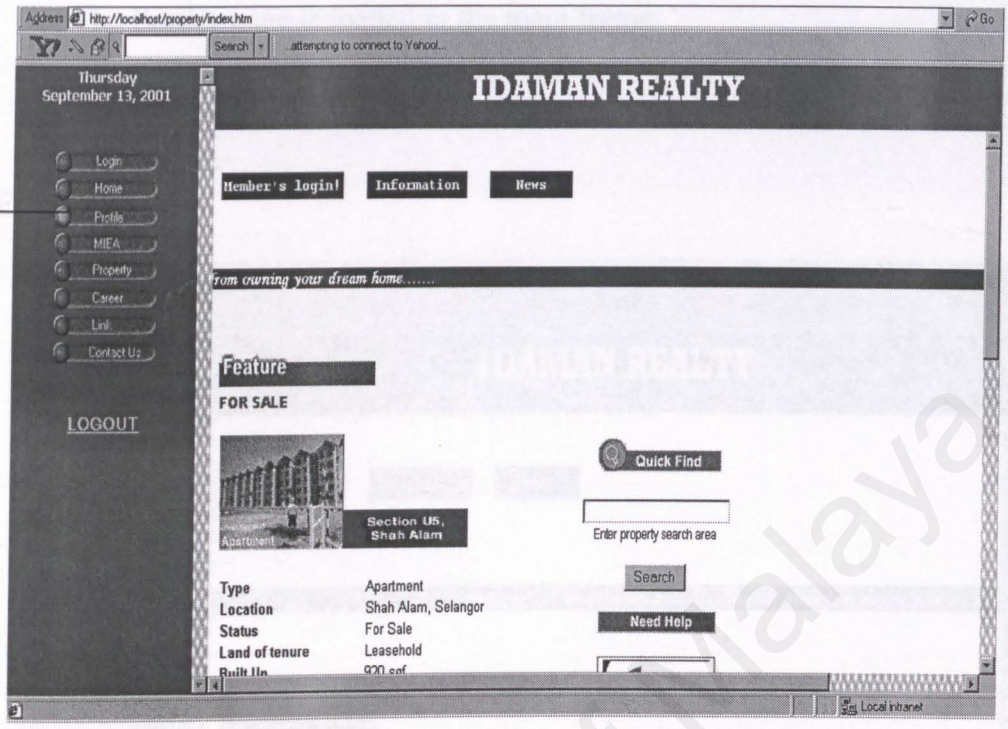


Feature
Info pag

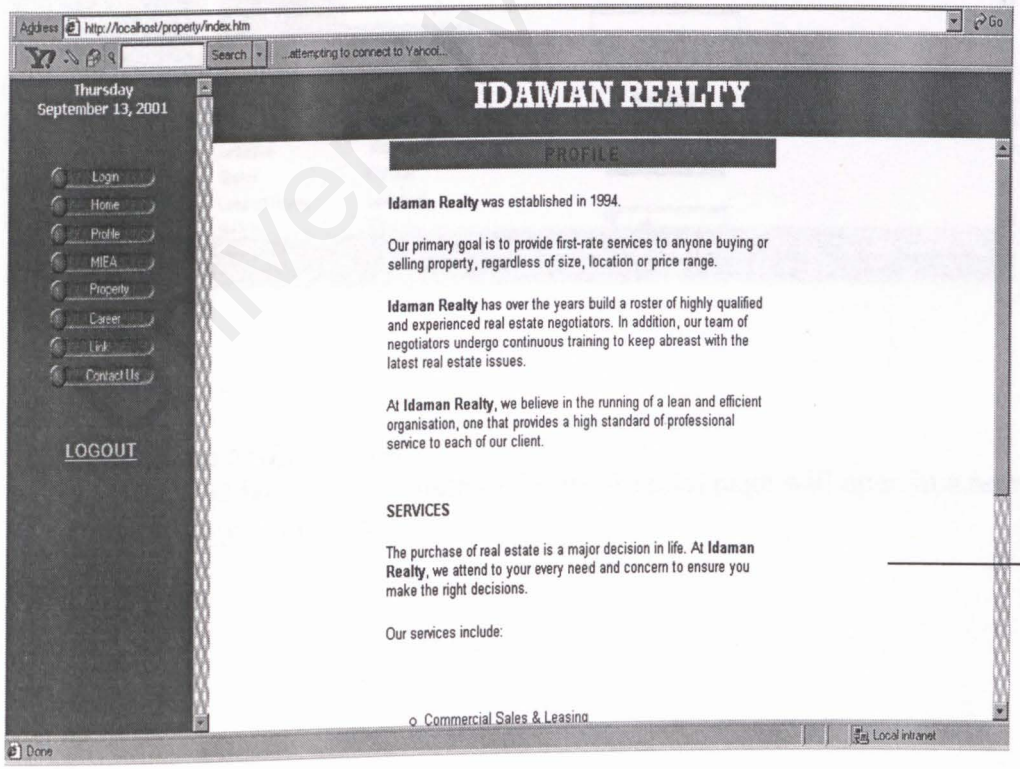
Steps :

1. Click on Login button
2. Login page will be opened in the main frame.
3. Fill in your email address and password.
4. Click on the Submit button.
5. You will be directed to the Features Info page.

3. Profile Page



Profile button

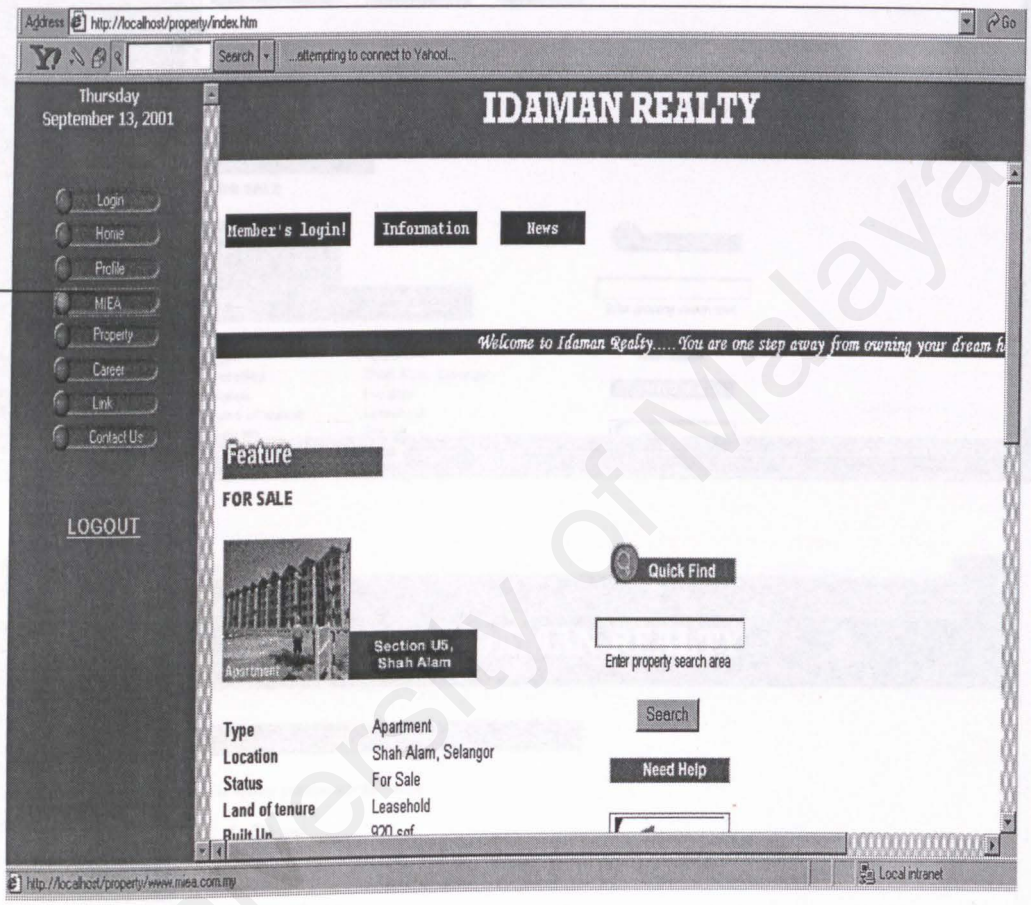


Profile page

Steps :

1. Click on the Profile button.
2. The Profile page is loaded in the main frame.

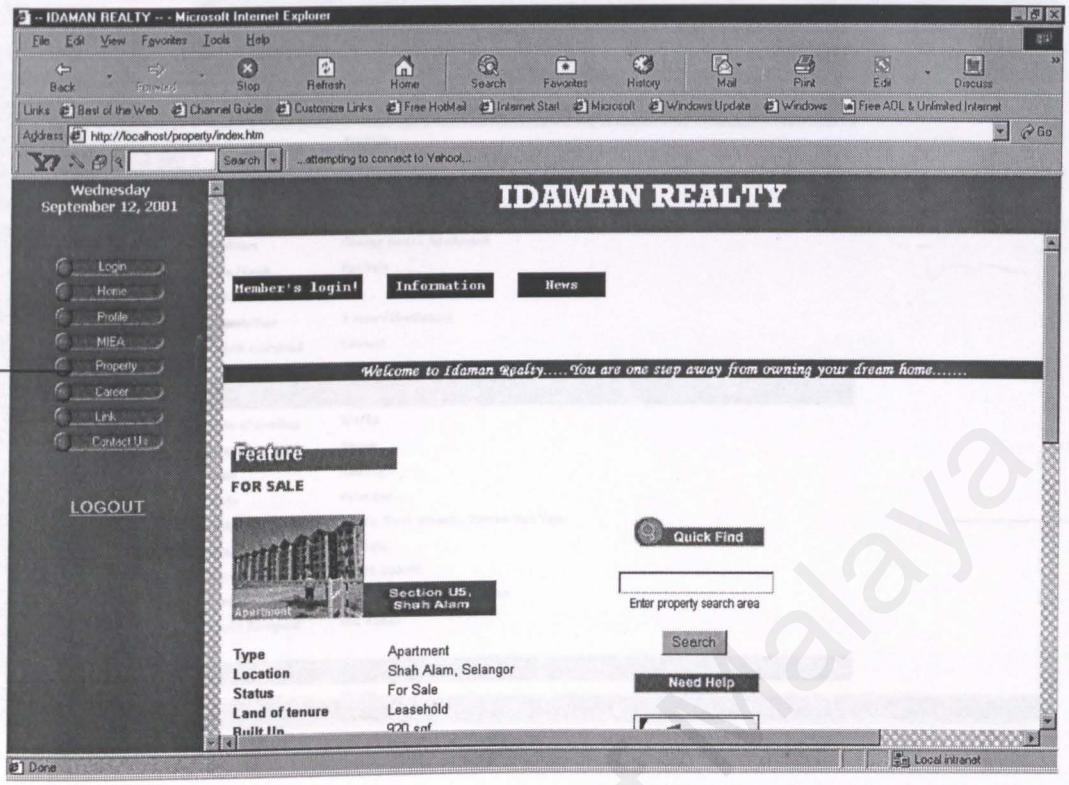
4. MIEA Page



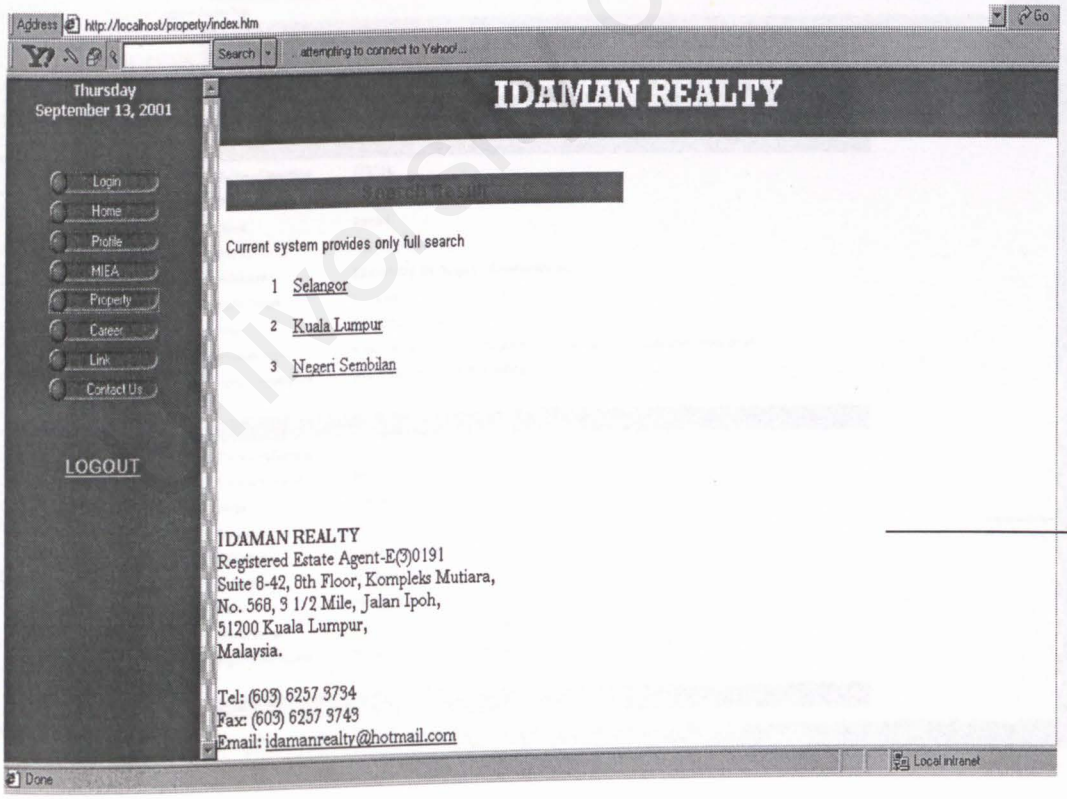
Steps :

1. Click on the MIEA button.
2. The MIEA (Malaysian Institute of Estate Agents) page will open in a new window. (www.miea.com)

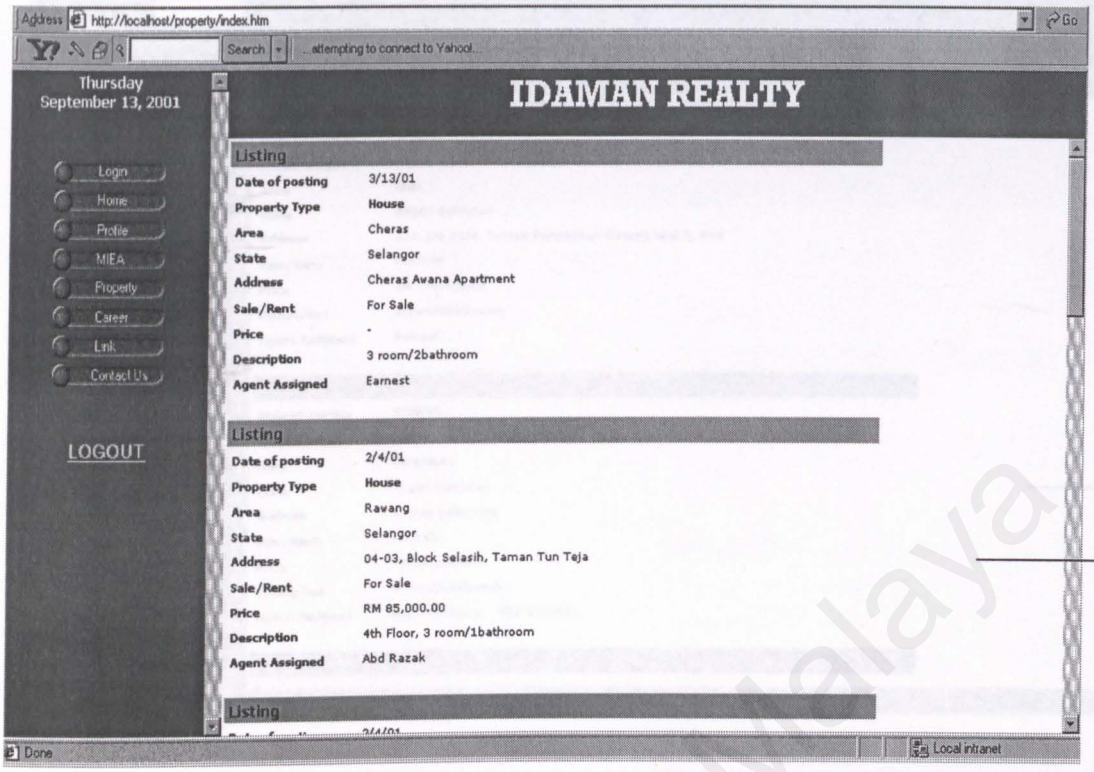
5. Property Page



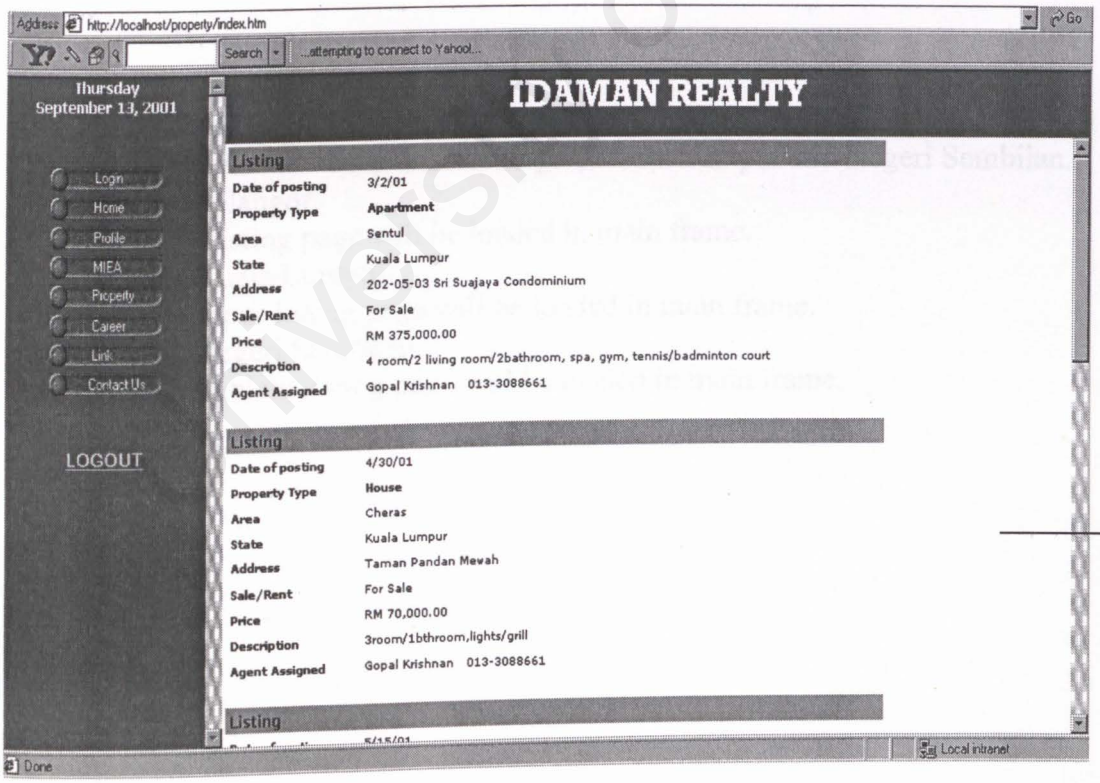
Property button



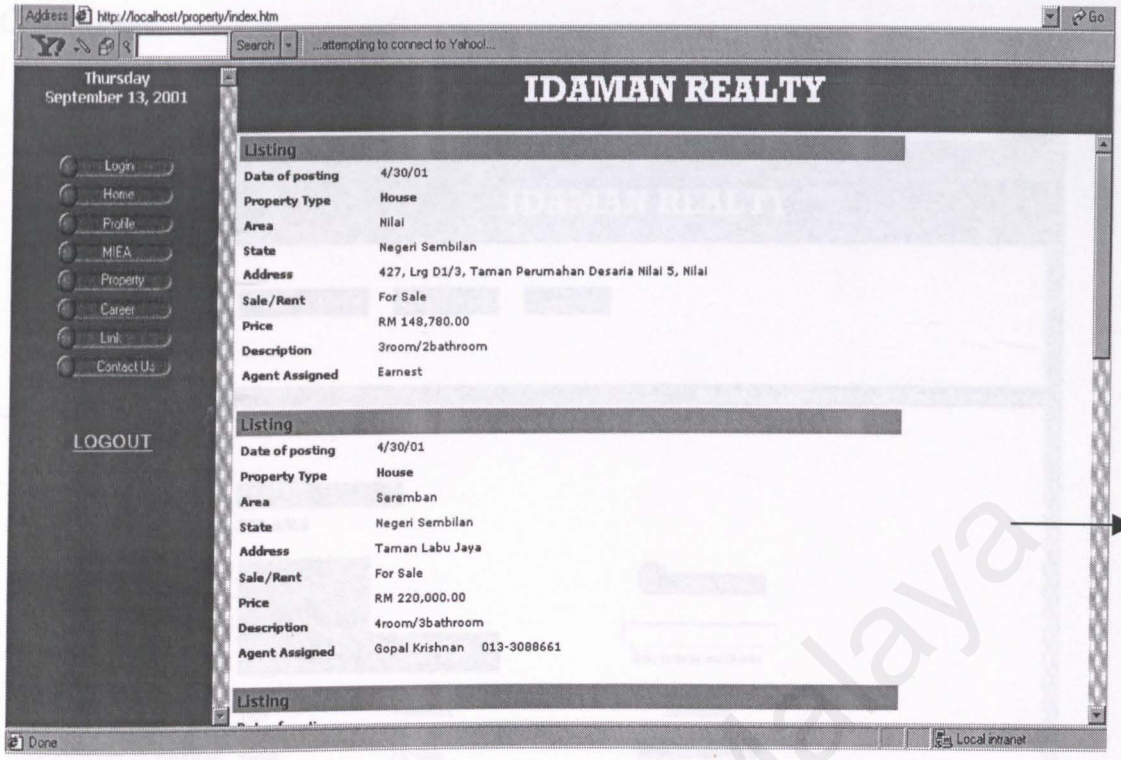
Results pag



Selangor listing page



KL listing page

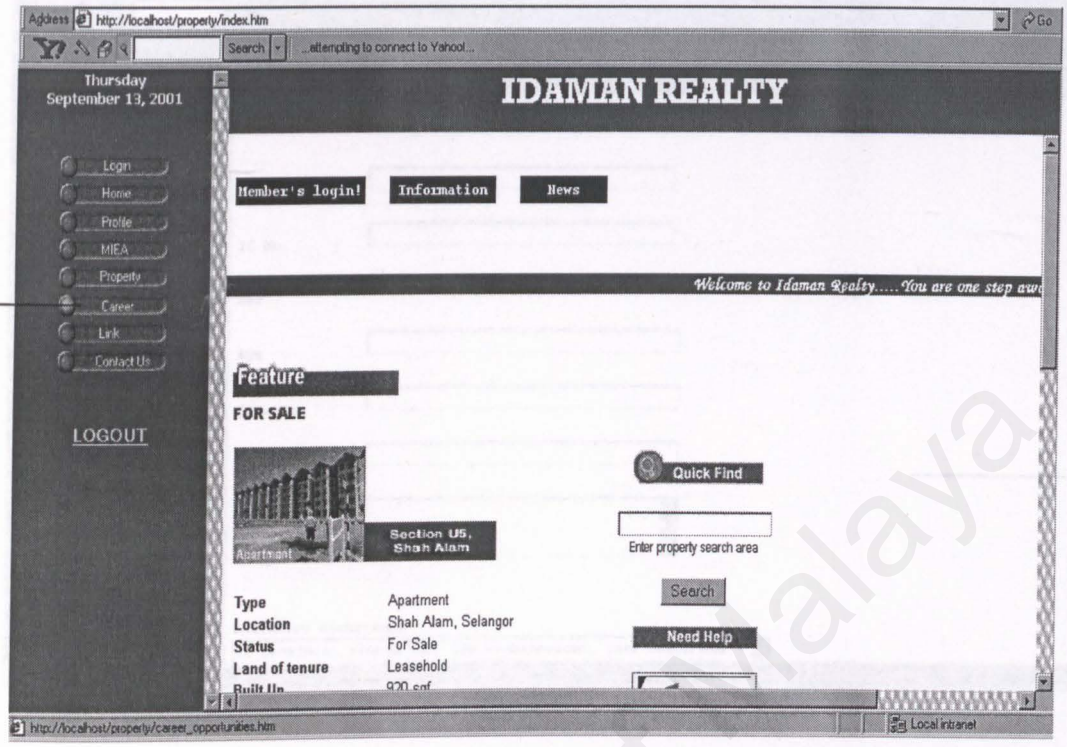


Negeri Sembilan listing pag

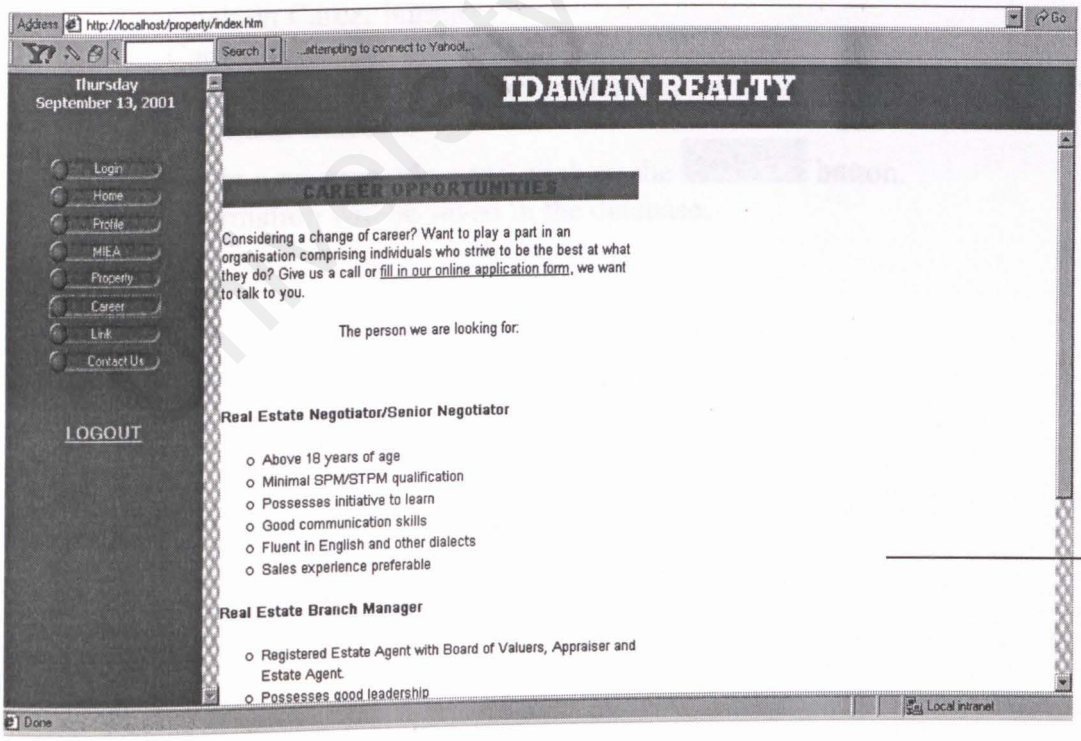
Steps :

1. Click on Property button.
2. Search result page will be loaded in the main frame.
3. 3 search areas will be listed : Selangor, Kuala Lumpur and Negeri Sembilan.
4. Click on Selangor.
5. Selangor Listing page will be loaded in main frame.
6. Click on Kuala Lumpur.
7. Kuala Lumpur listing page will be loaded in main frame.
8. Click on Negeri Sembilan.
9. Negeri Sembialn listing page will be loaded in main frame.

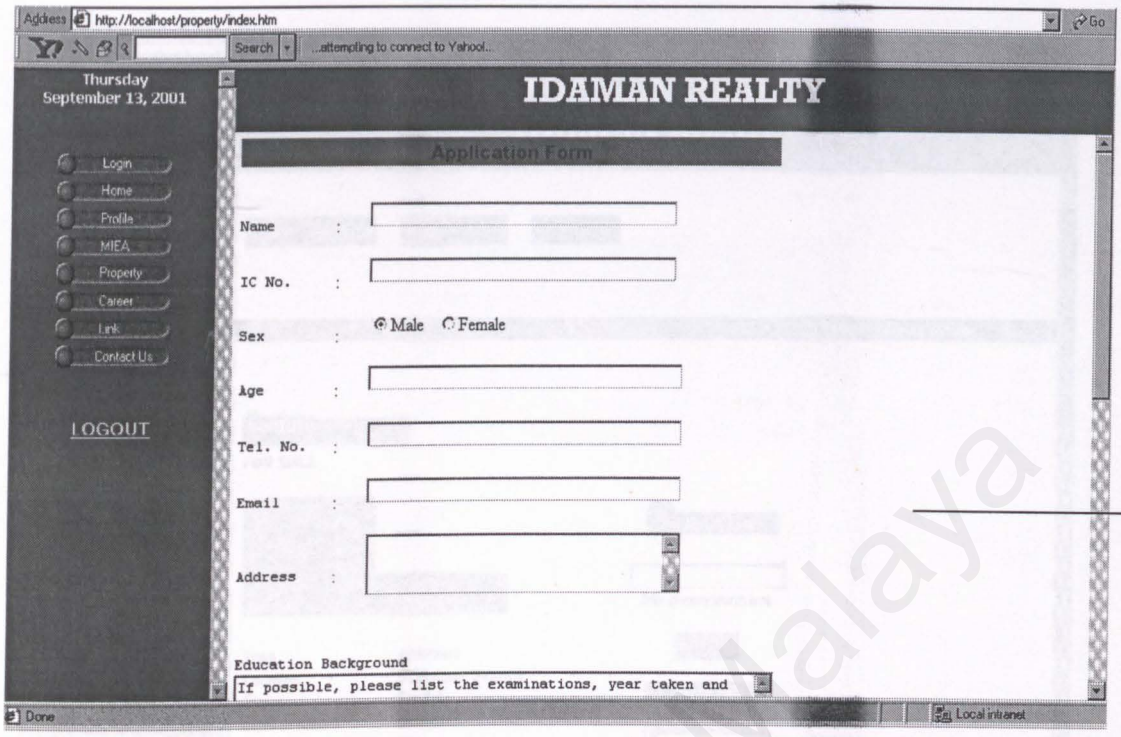
6. Career Page



Career button



Career pag

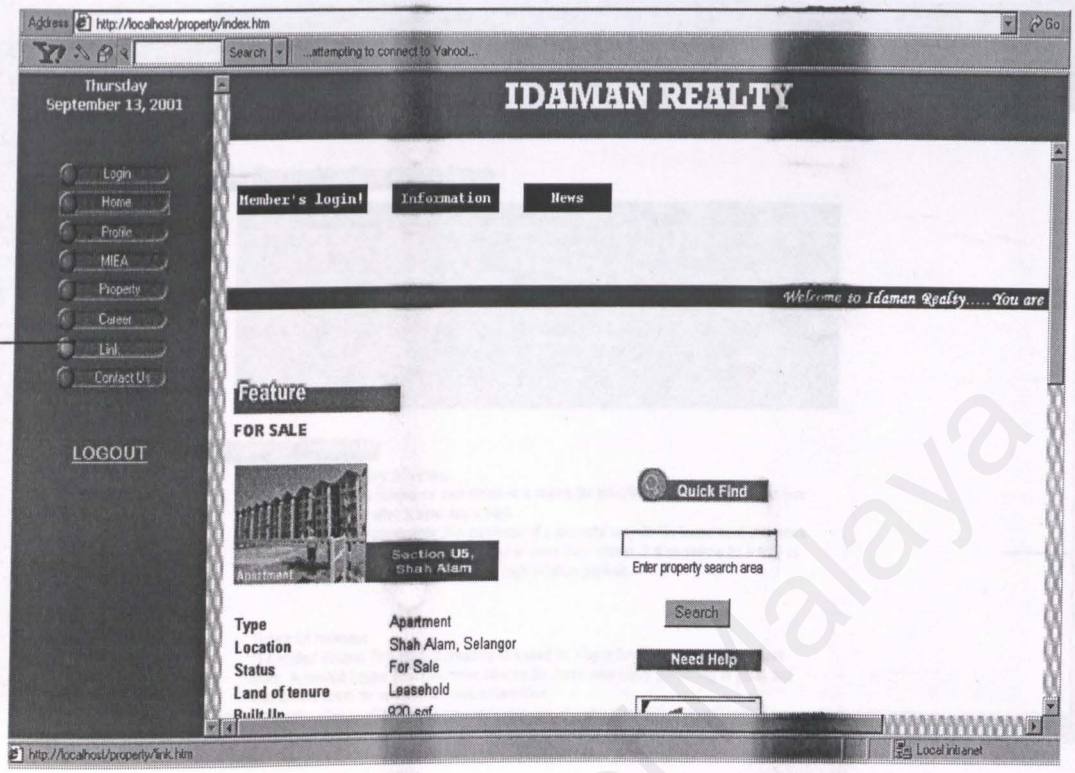


Online application page

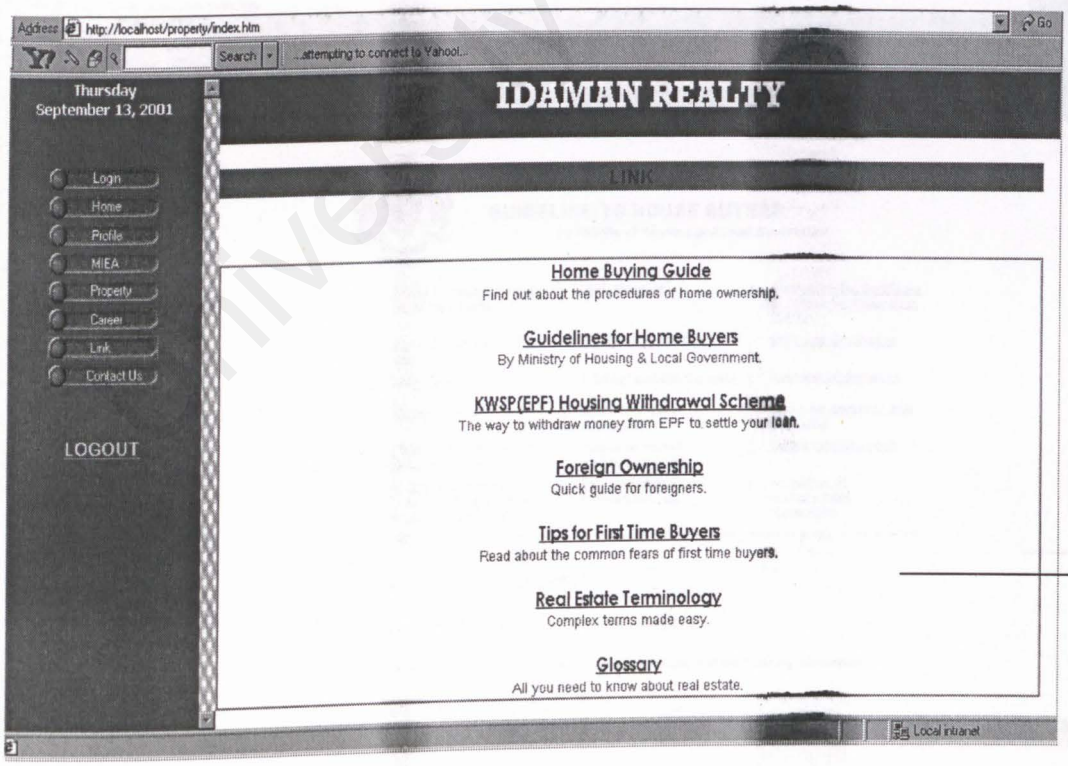
Steps :

1. Click on Career button.
2. Career page is loaded in main frame.
3. If you click on fill in online application form, online application page will be loaded in main frame.
4. Fill in your particulars and click on the Submit button.
5. Information will be saved in the database.

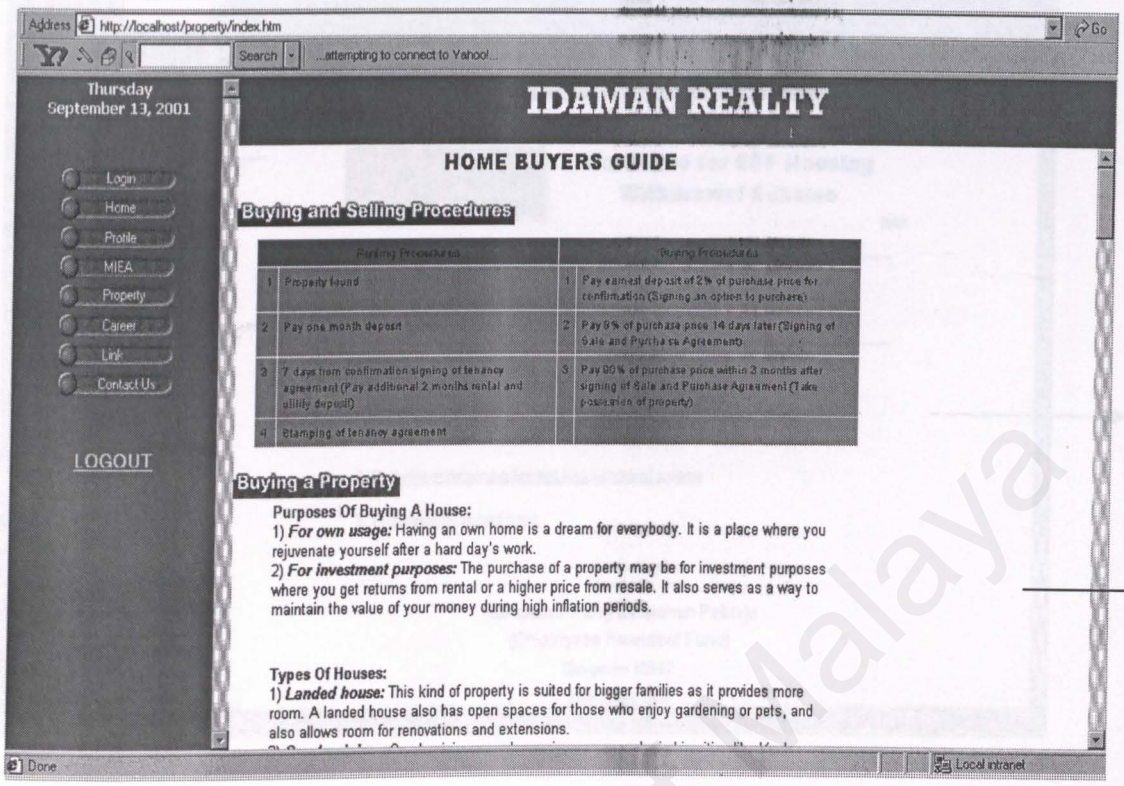
7. Link Page



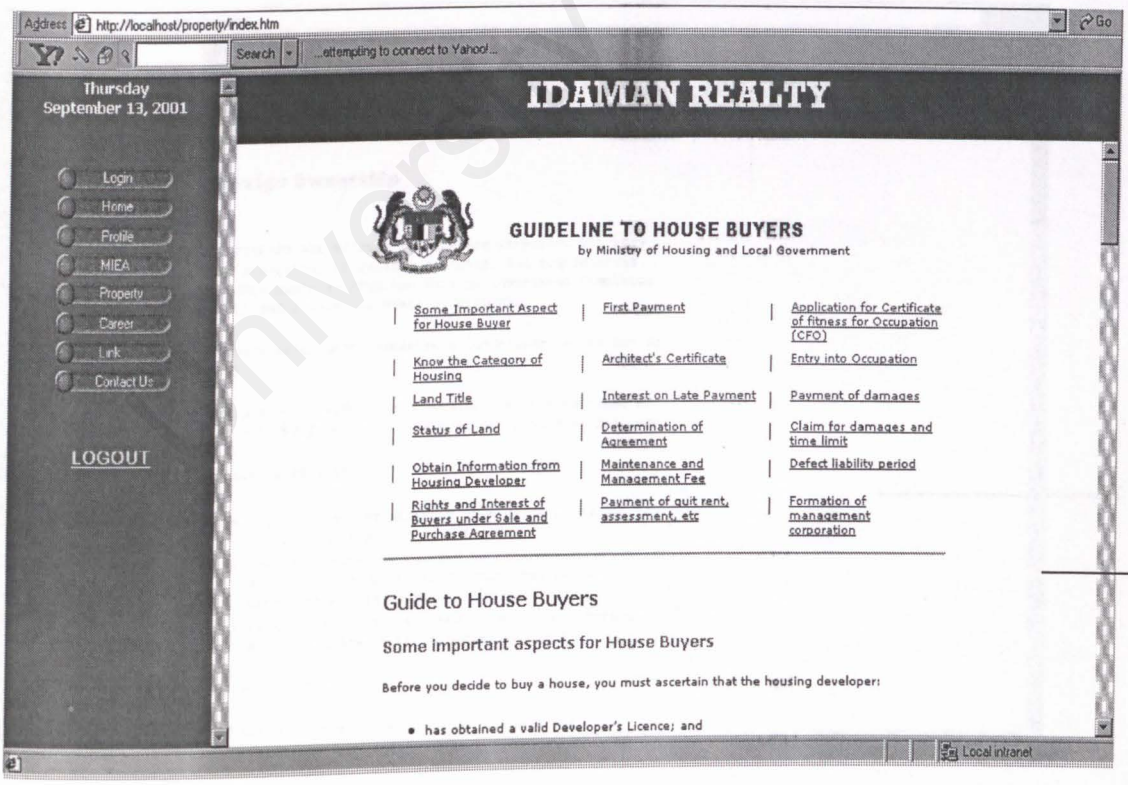
Link button



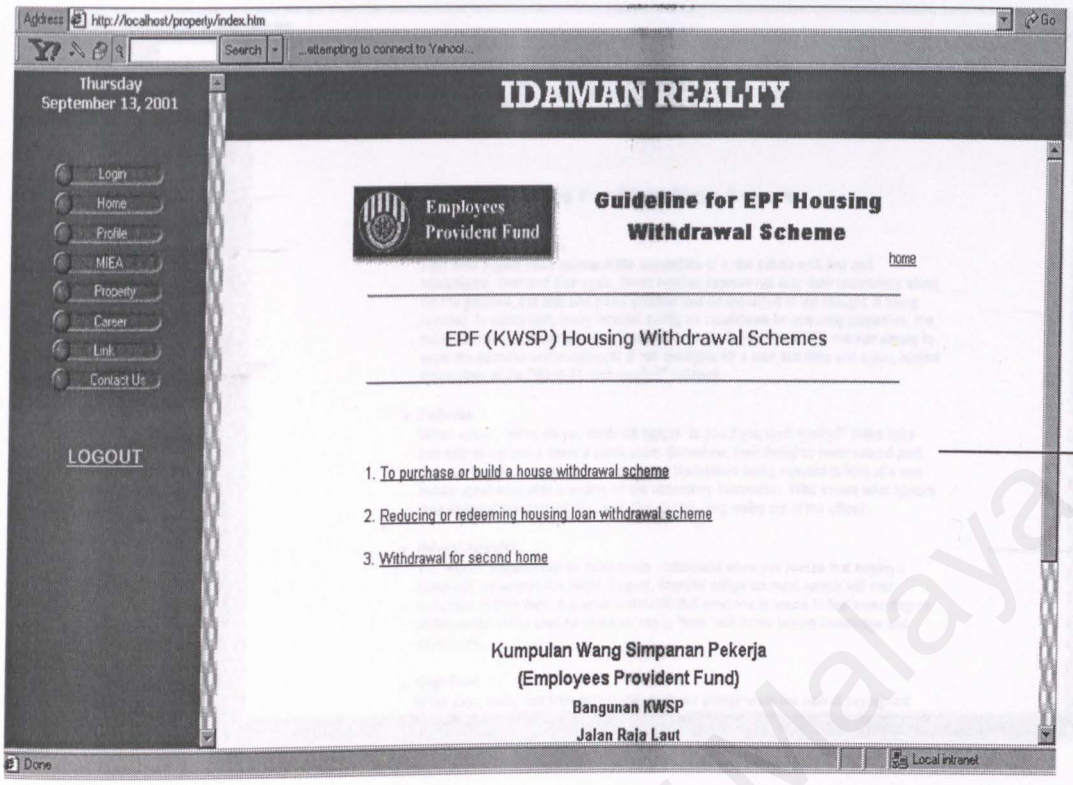
Link page



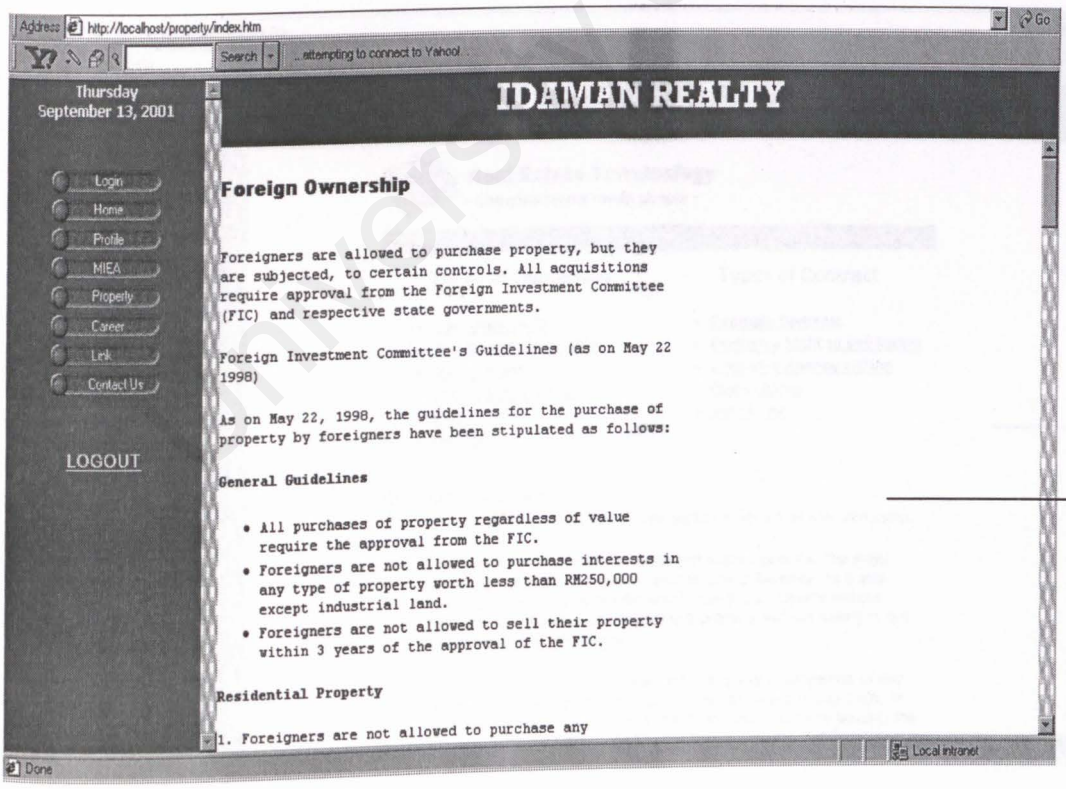
Home buyers guide page



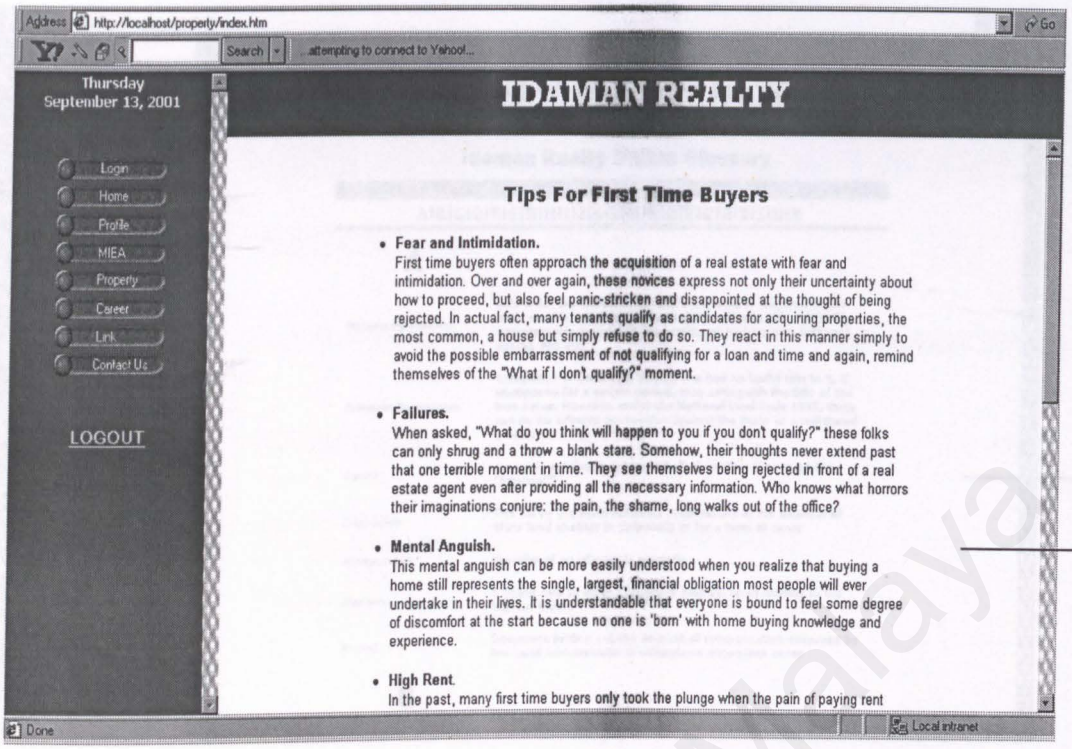
Guideline page



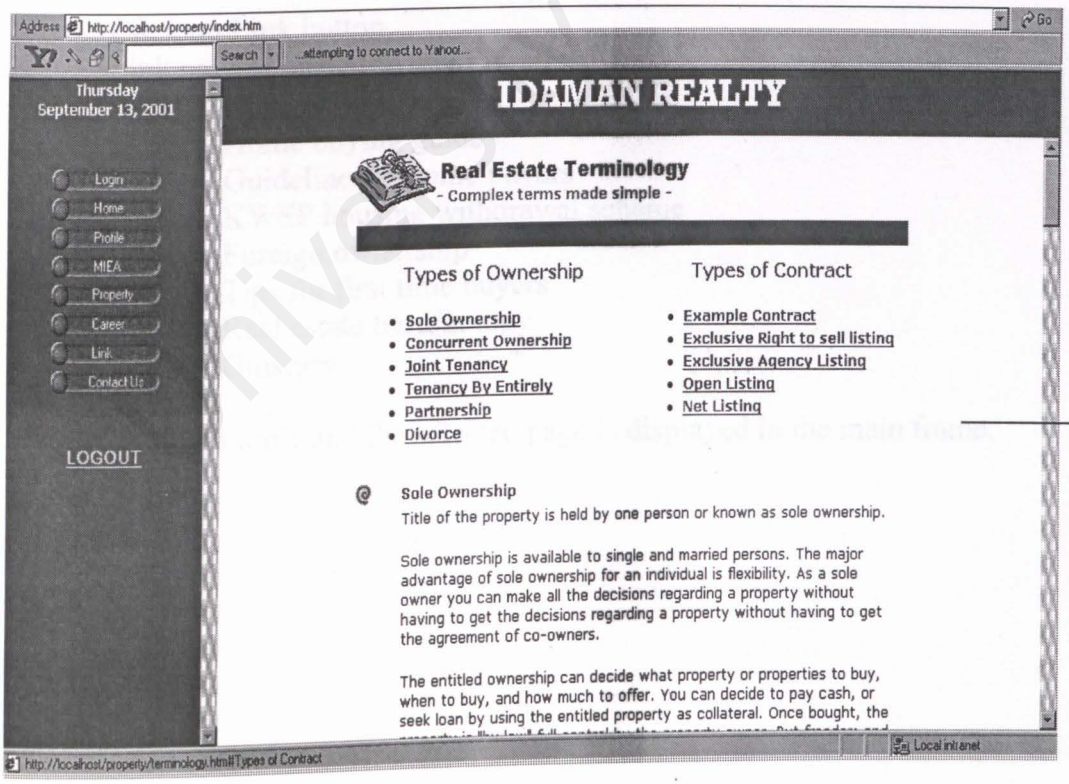
KWSP Housing Scheme page



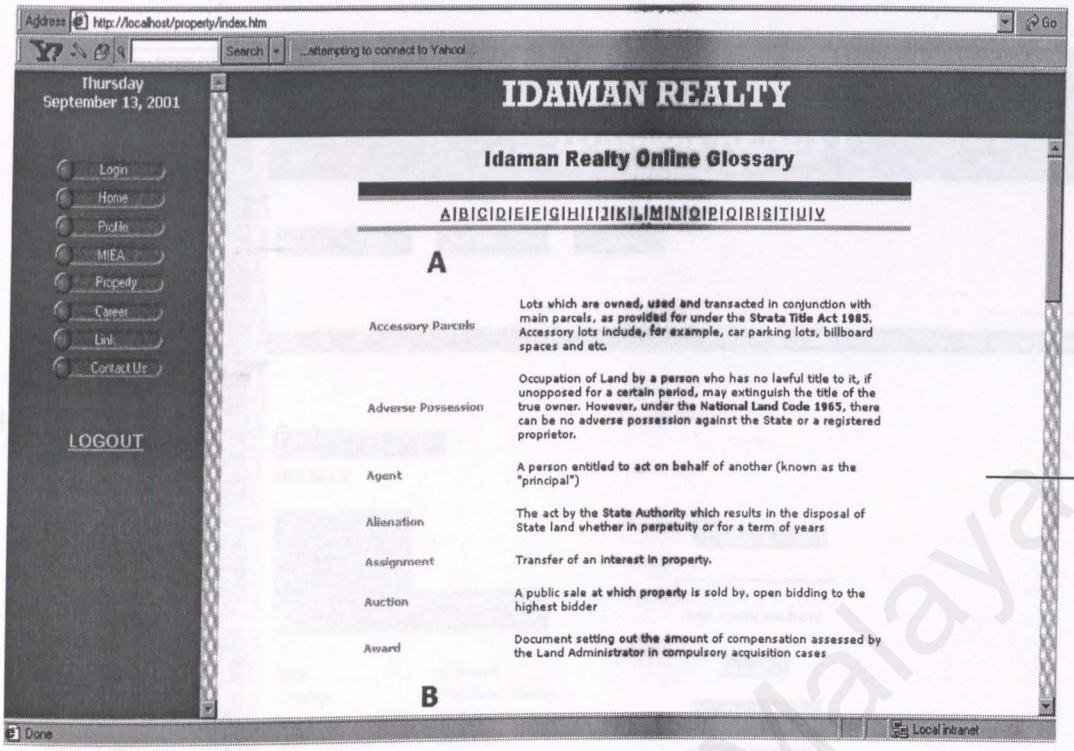
Foreign Ownership page



Tips for buyers pag



Terminolog page



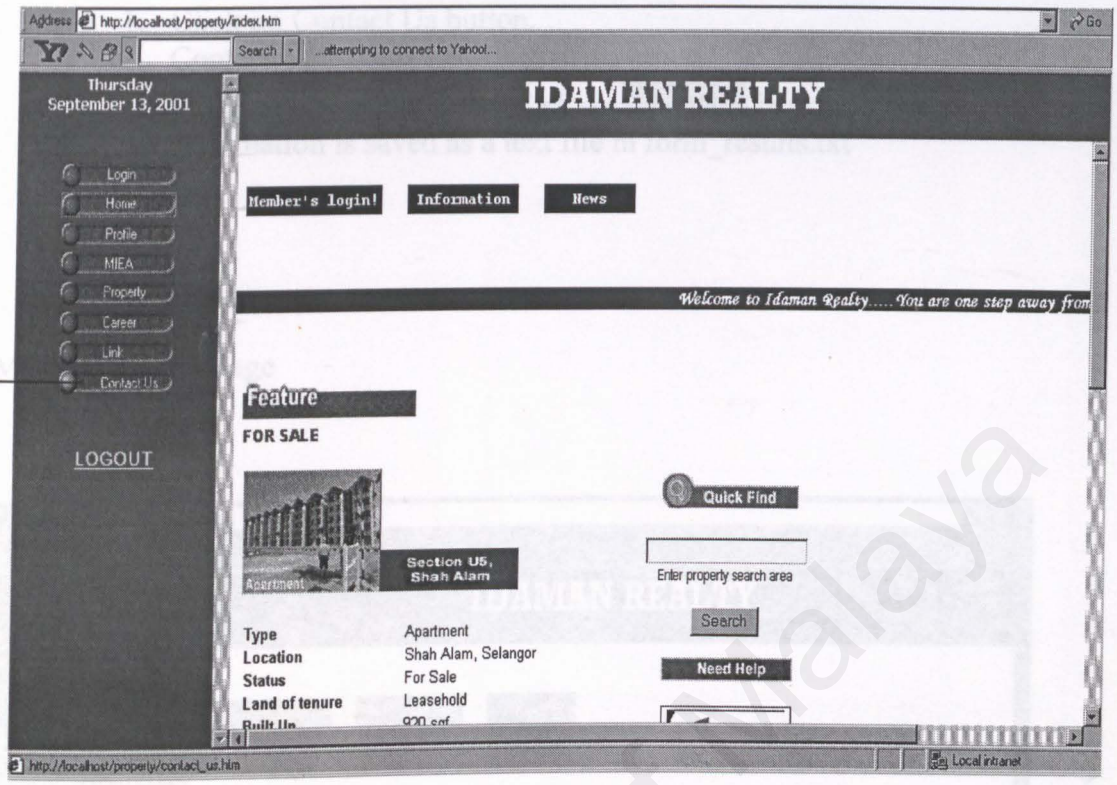
Glossary page

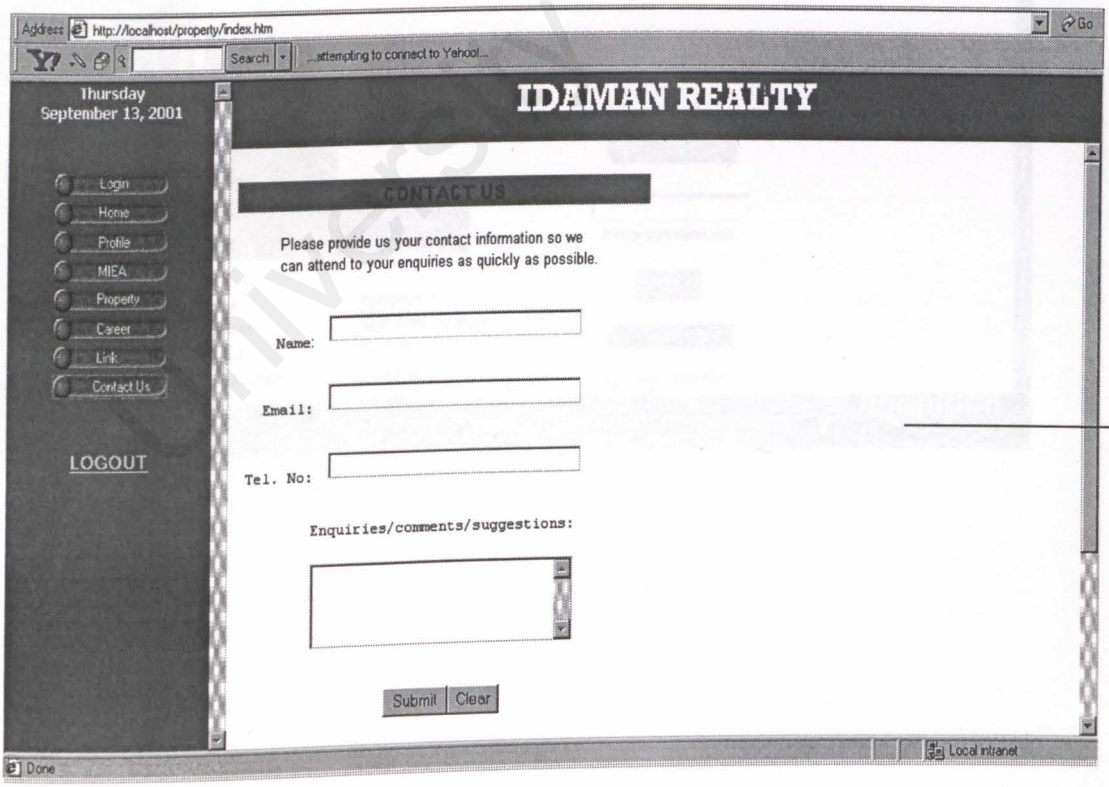
Steps :

1. Click on Link button.
2. Link page is loaded in main frame.
3. A list of articles are displayed :
   i. Home buying guide
   ii. Guideline for home buyers
   iii. KWSP housing withdrawal scheme
   iv. Foreign ownership
   v. Tips for first time buyers
   vi. Real estate terminology
   vii. Glossary
4. Click on each topic and the selected page is displayed in the main frame.

8. Contact Us Page

ontact
utton



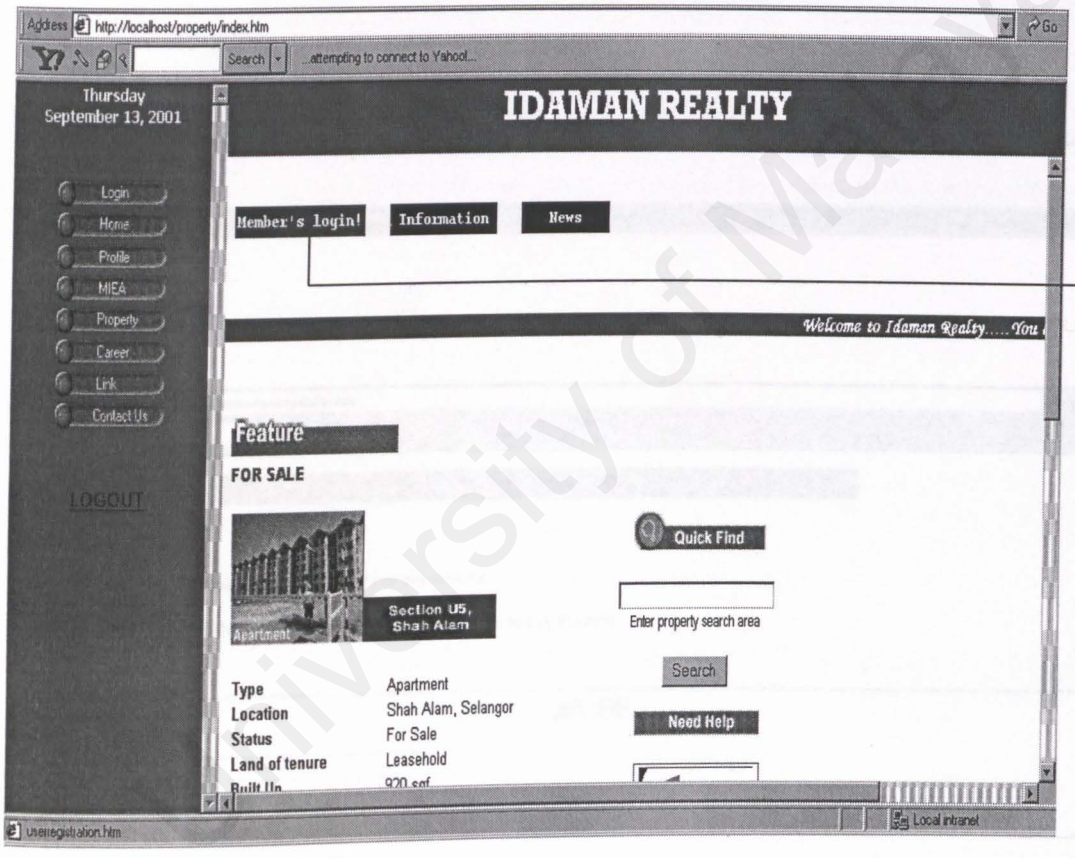


Contact
Us page

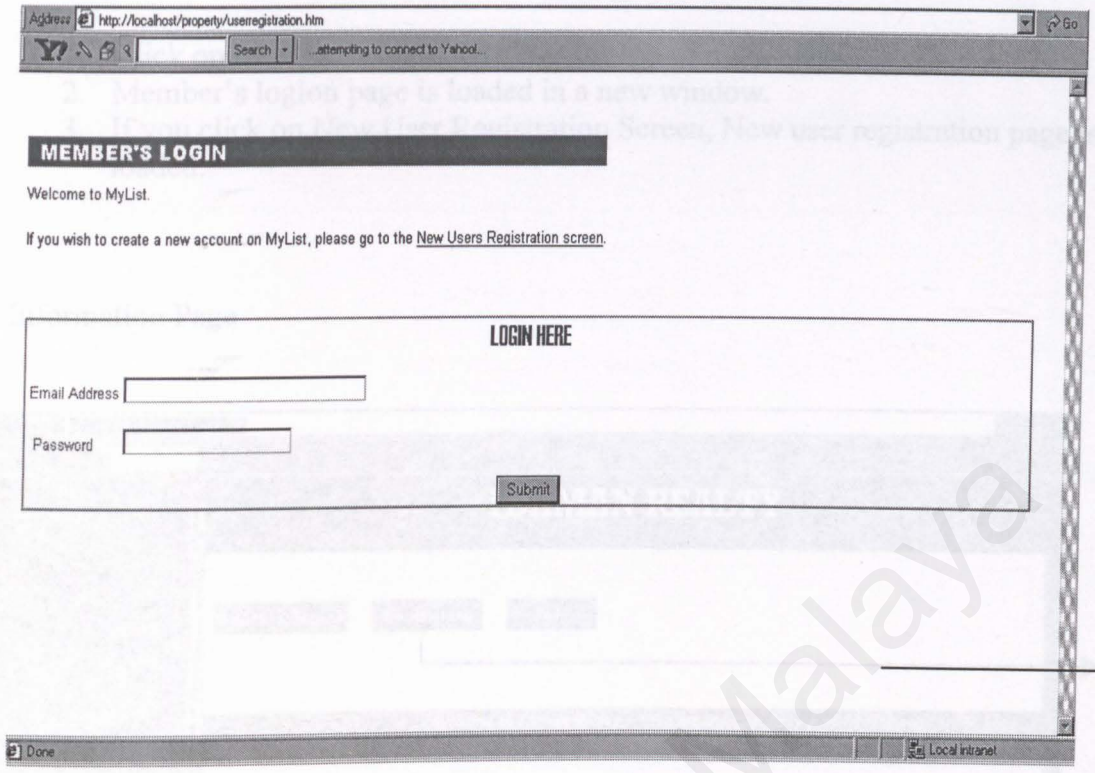
Steps:

1. Click on Contact Us button.
2. Contact Us page is loaded in main frame.
3. Fill in any comments and click on Submit button.
4. Information is saved as a text file in form_results.txt

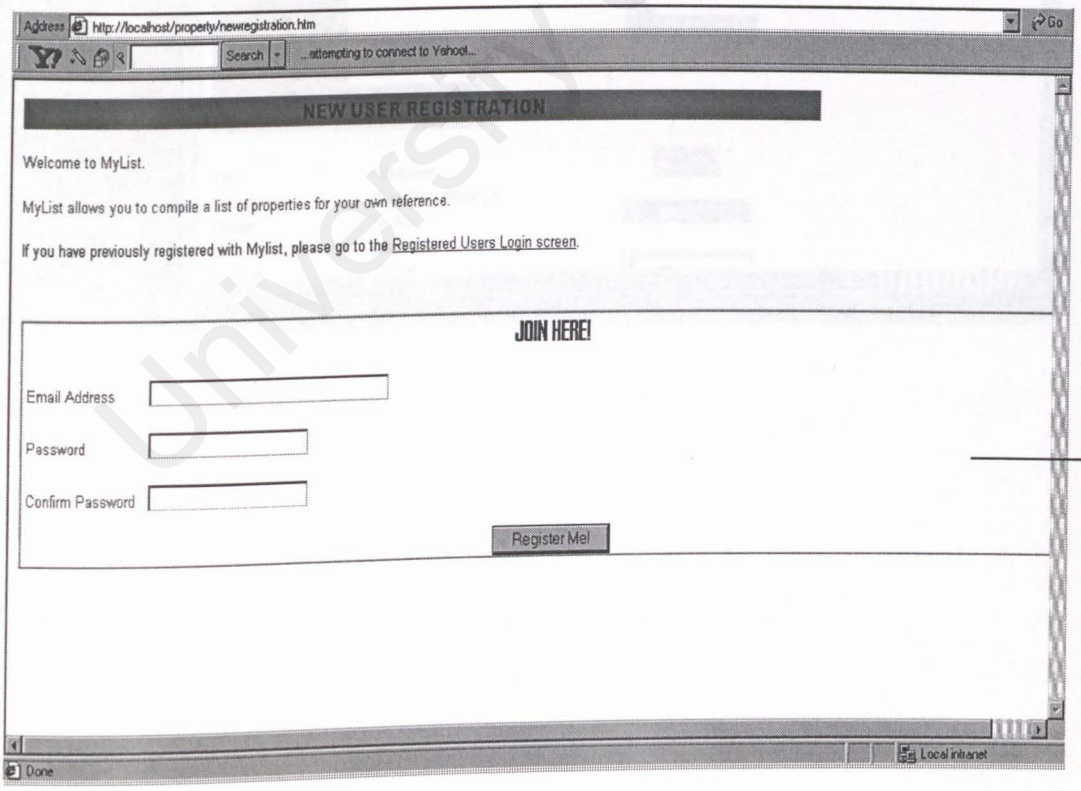
9. Member's login Page



Member's login button



Member's login page

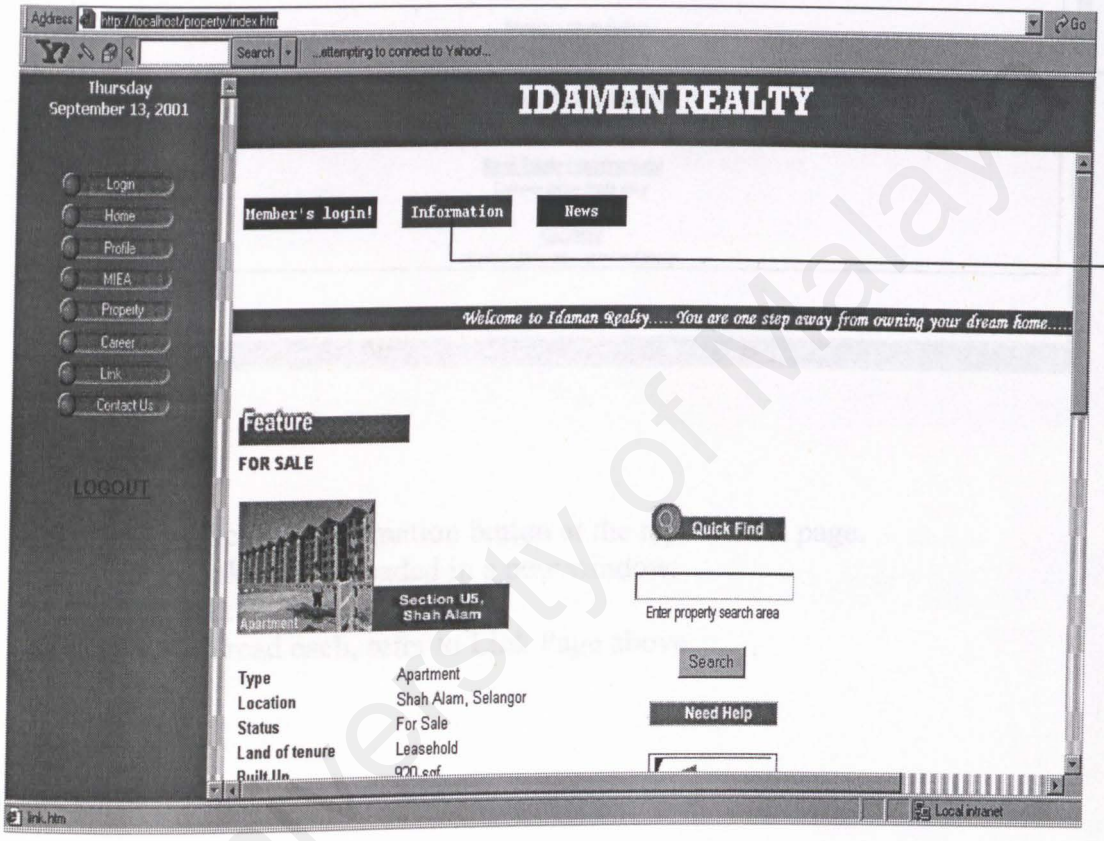


New user registration page

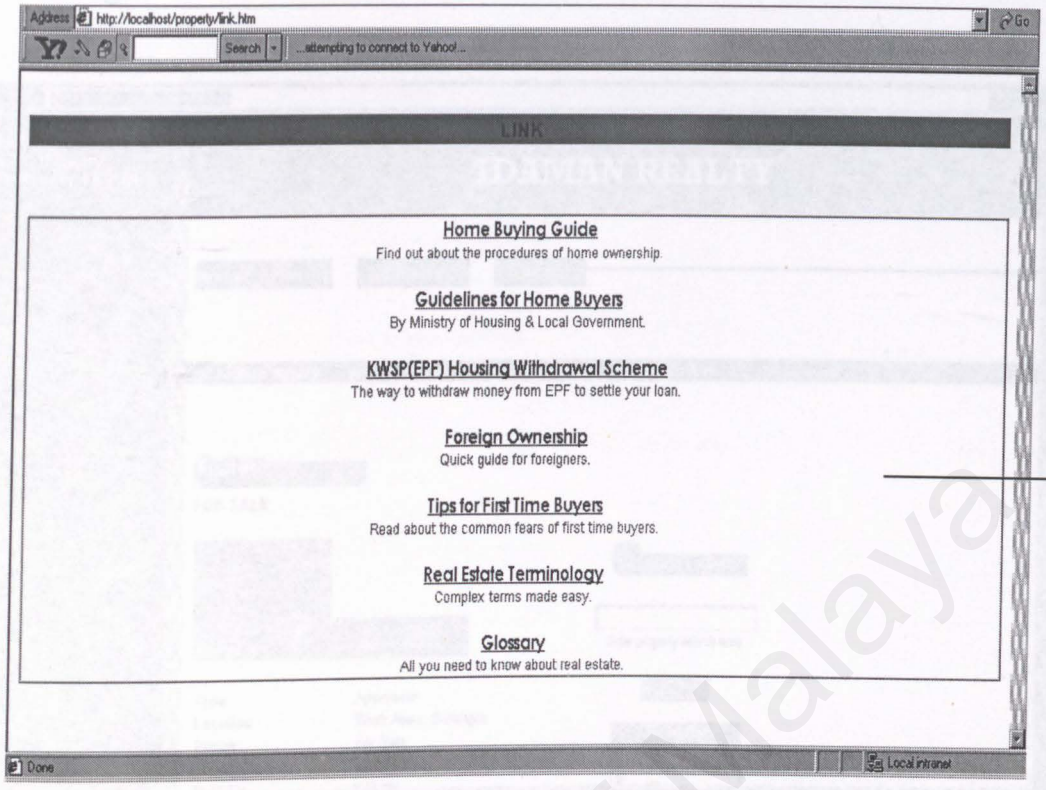
Steps :

1. Click on Member's login button at the top of main page.
2. Member's logion page is loaded in a new window.
3. If you click on New User Registration Screen, New user registration page is loaded.

10. Information Page



Information button

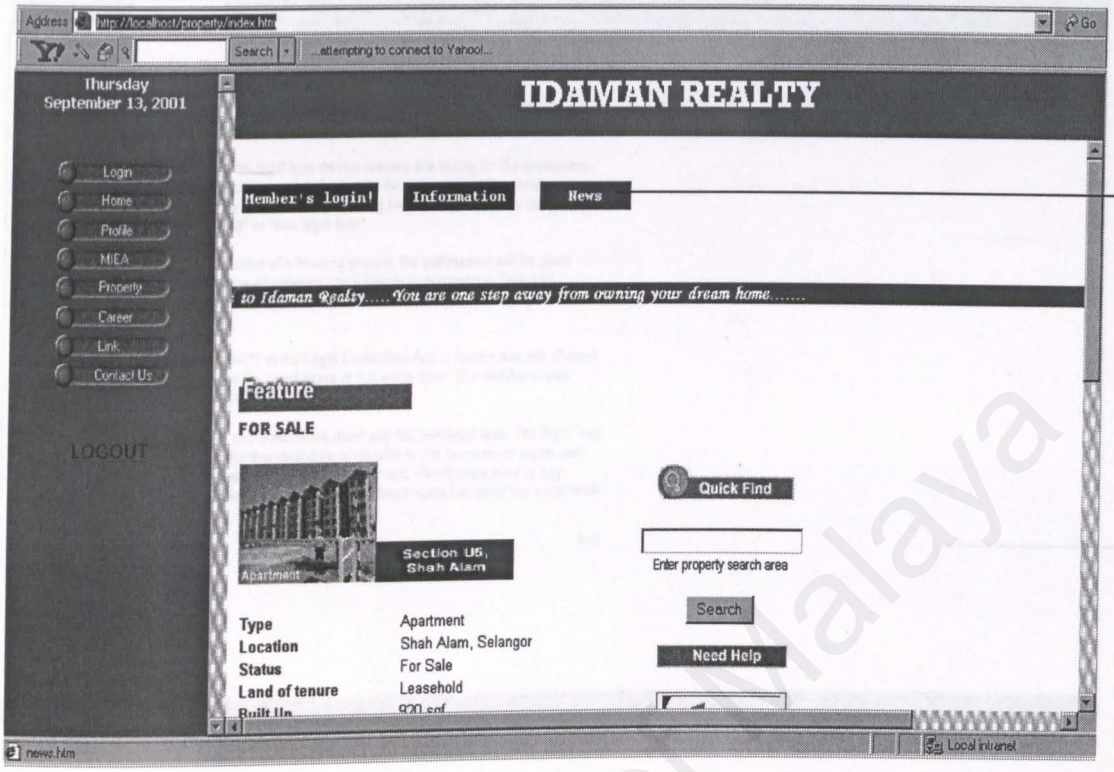


Link page

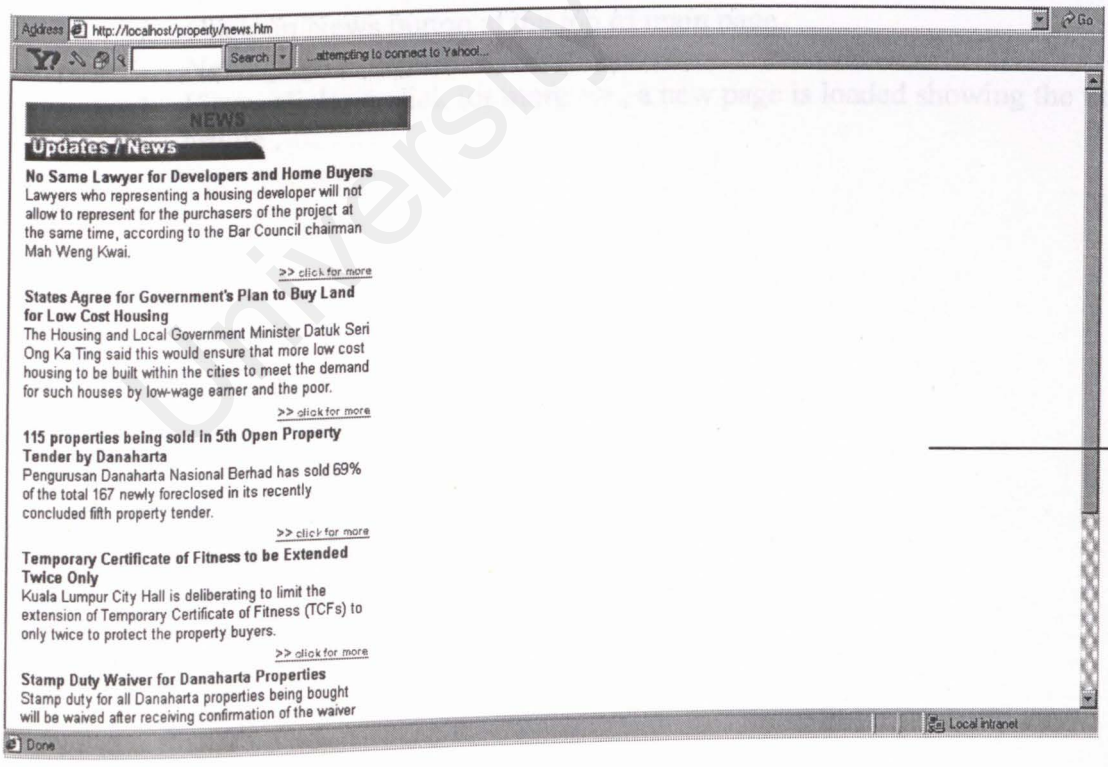
Steps :

1. Click on Information button at the top of main page.
2. Link page is loaded in a new window.
3. List of articles are listed.
4. To read each, refer to Link Page above.

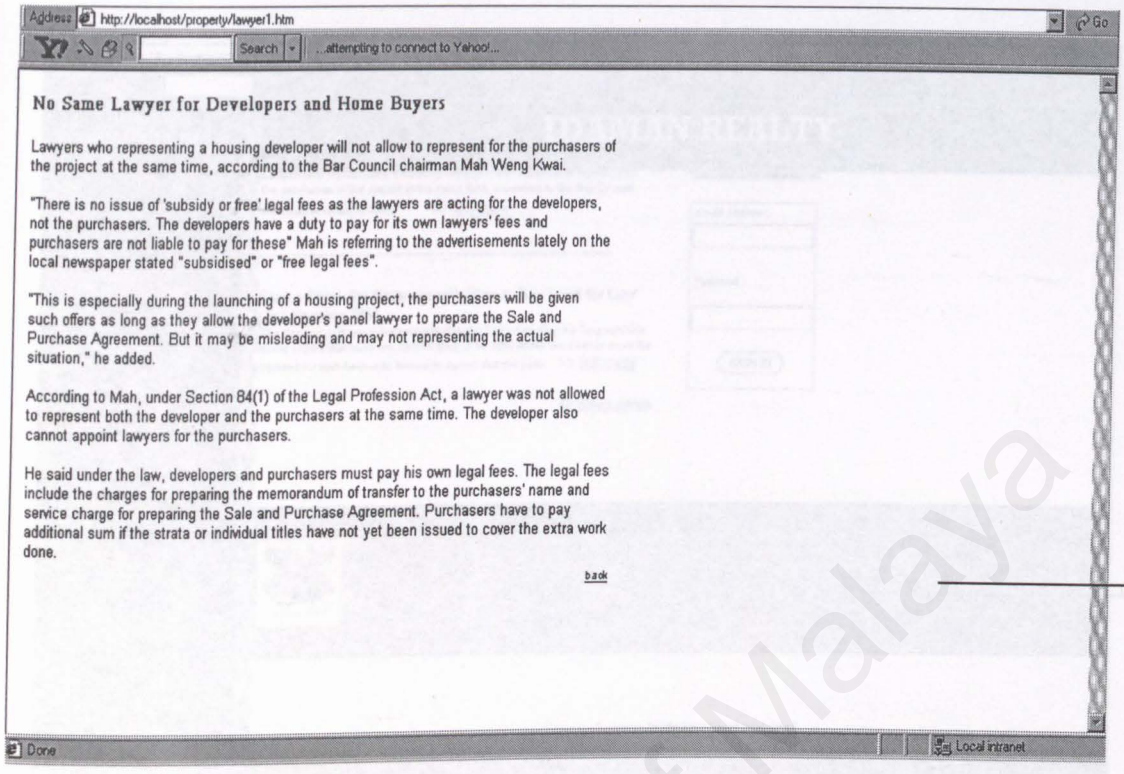
11. News Page



News button



News page

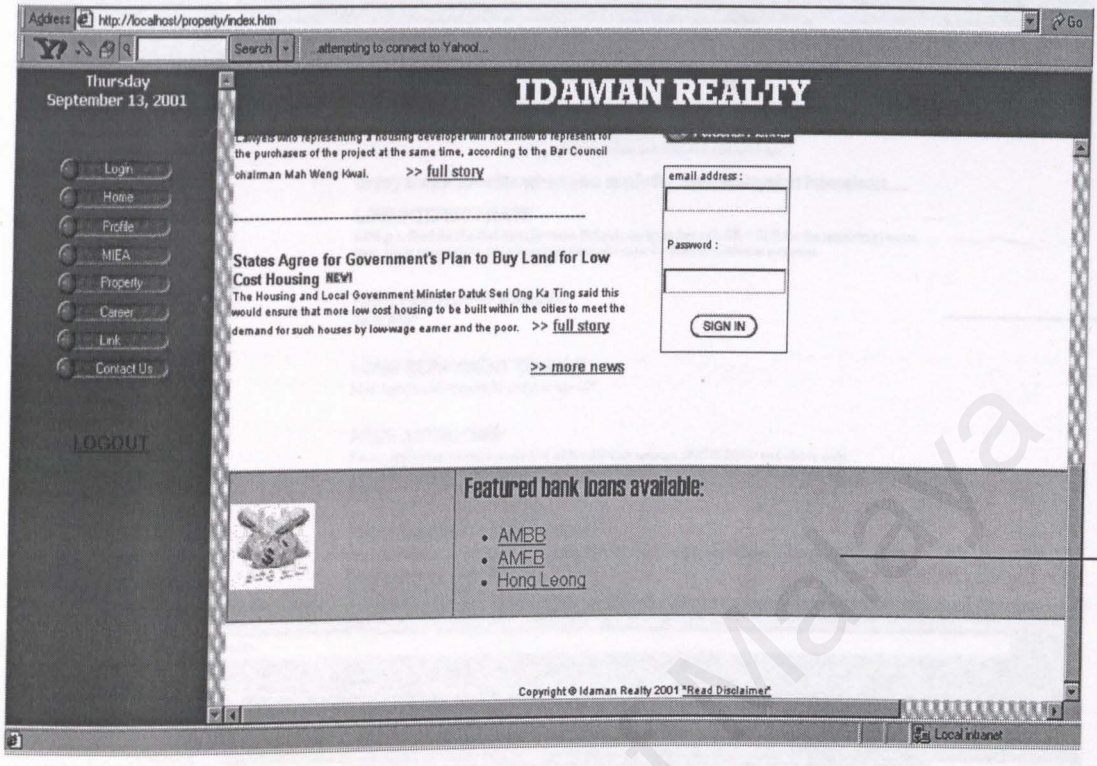


Full article page

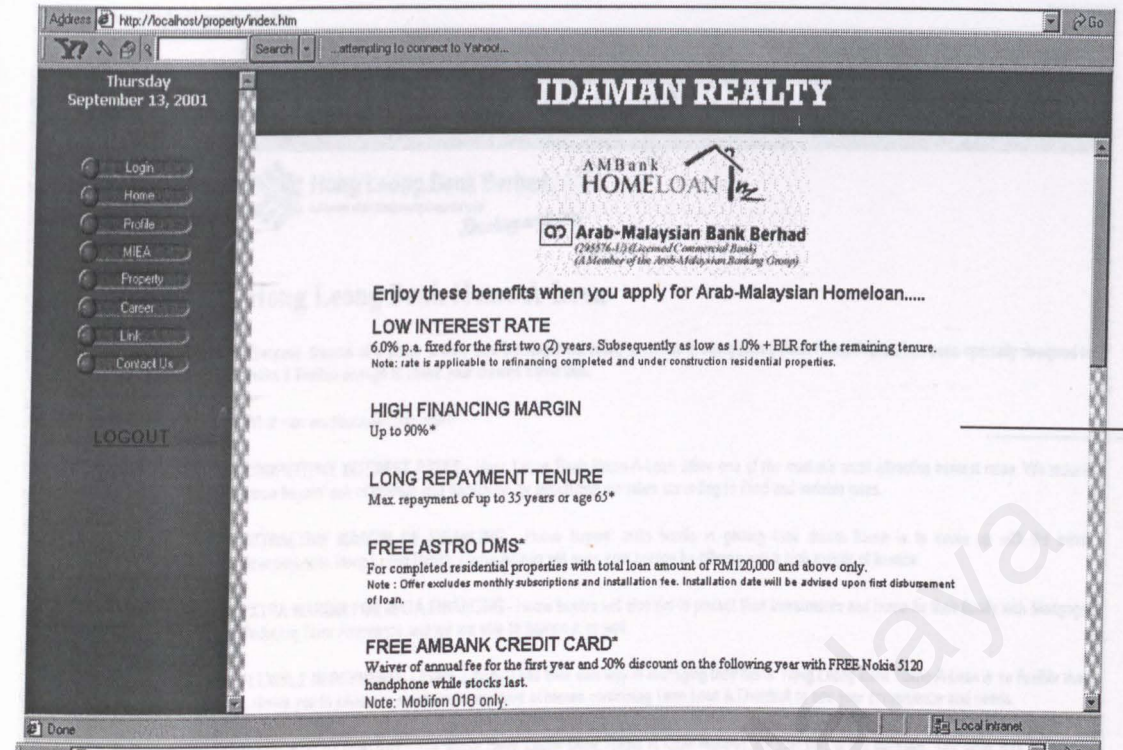
Steps :

1. Click on News button at the top of main page.
2. News page is loaded in a new window.
3. If you click on click for more >> , a new page is loaded showing the full article .

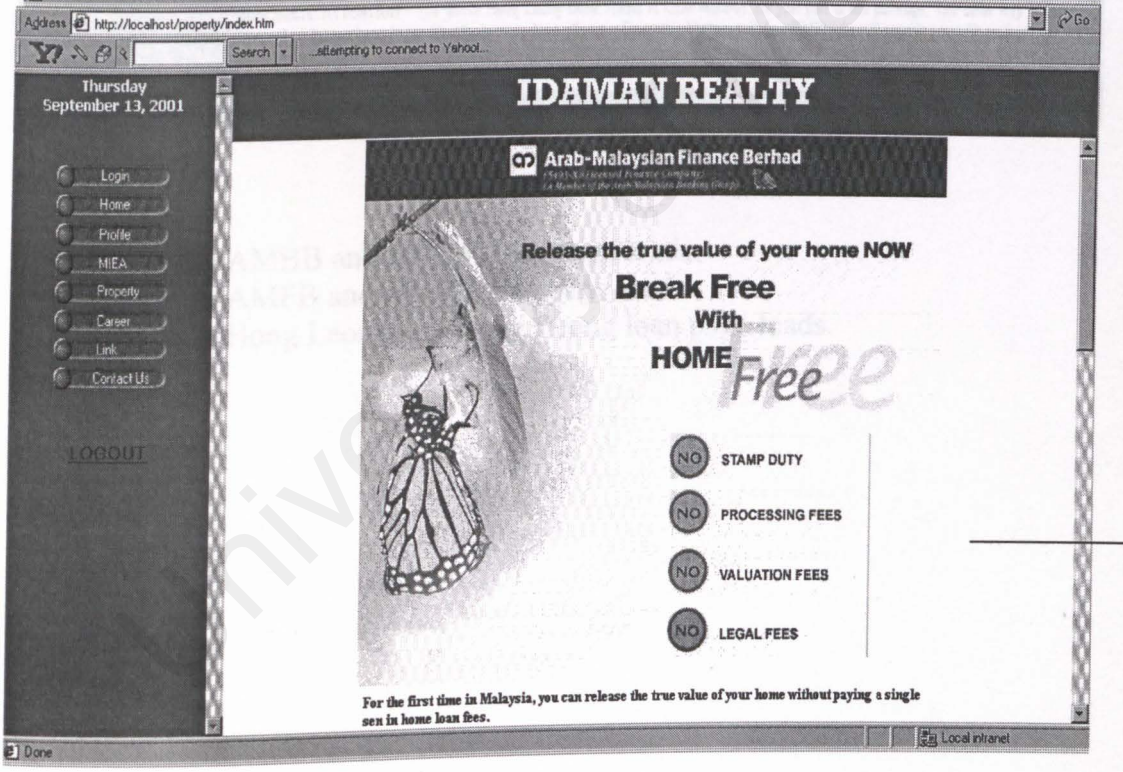
12. Bank loan Section



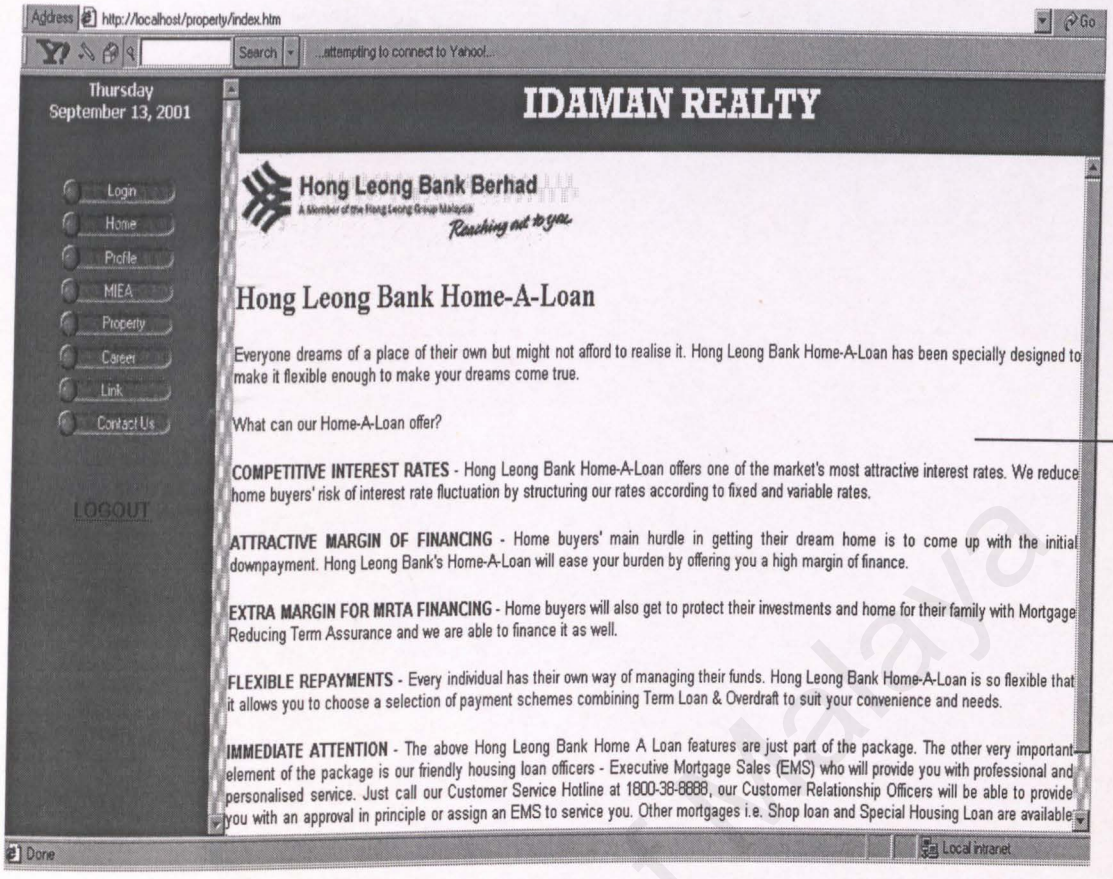
Bank loans



AMBB loan page



AMFB loan page



Hong Leong loa page

Steps :

1. Click on AMBB and AMBB loan page loads.
2. Click on AMFB and AMFB loan page loads.
3. Click on Hong Leong and Hong Leong loan page loads.

APPENDIX C - SOURCE CODE

```
<HTML>

<HEAD>
<TITLE>Main</TITLE>
<META name="description" content="">
<META name="keywords" content="">
<!--<base target="_self">-->
<script language = "VBscript">

sub Btnon_Click()
'if document.ArrangeForm.Email.value = "test@hotmail.com"  and
document.ArrangeForm.password,value = "test"  then
if document.ArrangeForm.Email.value  = "test@hotmail.com"  and
document.ArrangeForm.password.value  = "test"  then
   window.open "feature_info.htm"

elseif document.ArrangeForm.Email.value   = "lavania@hotmail.com"  and
document.ArrangeForm.password.value  = "lavania"  then
         window.open "feature_info.htm"
elseif document.ArrangeForm.Email.value   = "bill@microsoft.com"  and
document.ArrangeForm.password.value  = "bill"  then
         window.open "feature_info.htm"

else
   Msgbox "Email Name or password Mismatch"
end if
end sub

sub BtnReg_Click()
'   msgbox "Test1"
   window.navigate "userregistration.htm"
end sub

sub Search_Click()
   dim strName
   strName = UCase(document.ArrangeForm.Tsearch.value)
    'msgbox strName
   select case strName
   case "NEGERI SEMBILAN"
      window.navigate ("feature_info_NS.htm")
   case "NS"
      window.navigate ("feature_info_NS.htm")
   case "KL"
      window.navigate ("feature_info_KL(1).htm")
   case "KUALA LUMPUR"
      window.navigate ("feature_info_KL(1).htm")

   case "SELANGOR"
      window.navigate ("feature_info_Sel(1).htm")
   case else
      window.navigate ("Noresult.htm")

   end select

end sub
</script>
```

```
<meta name="Microsoft Border" content="none">
<base target="_main">
</HEAD>
<BODY BGCOLOR=FFFFFF TEXT=000000 LINK=0000FF VLINK=800080>

<p>

 
</p>

<p>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  <param name="effect" value="fill">
  <param name="url" valuetype="ref" value="userregistration.htm">
  <param name="font" value="Courier">
  <param name="fontstyle" value="bold">
  <param name="fontsize" value="14">
  <param name="text" value="Member's login!">
  <param name="color" value="#003300">
  <param name="hovercolor" value="#006600">
</applet>      <applet code="fphover.class" width="104"
height="24">
  <param name="textcolor" value="#FFFFFF">
  <param name="text" value="Information">
  <param name="effect" value="fill">
  <param name="url" valuetype="ref" value="link.htm">
  <param name="font" value="Courier">
  <param name="fontstyle" value="bold">
  <param name="fontsize" value="14">
  <param name="color" value="#003300">
  <param name="hovercolor" value="#006600">
</applet>
     <applet code="fphover.class" width="86" height="24">
  <param name="textcolor" value="#FFFFFF">
  <param name="text" value="News">
  <param name="effect" value="fill">
  <param name="url" valuetype="ref" value="news.htm">
  <param name="fontsize" value="14">
  <param name="font" value="Courier">
  <param name="fontstyle" value="bold">
  <param name="color" value="#003300">
  <param name="hovercolor" value="#006600">
</applet>
    
</p>

<p>

 
</p>

<p>

<marquee bgcolor="#663300" style="color: #FFFFFF; font-family: Monotype
Corsiva; font-weight: bold">Welcome
to Idaman Realty.....You are one step away from owning your dream
home.......</marquee>
</p>
```

```
<p>
 
</p>
<p>

 

<img border="0" src="images/feat1.gif" width="161" height="29"><font
color="#CC3000" face="Arial Black" size="2"><br> 
FOR
SALE</font>
</p>

<table border="0" width="541" cellspacing="0" height="46">
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                    <td height="60" width="26" rowspan="4">
                    </td>
                    <td height="60" width="711" rowspan="4">
                      <p align="left"><img border="0" src="images/apt1.bmp"
width="128" height="100"><img border="0" src="images/apt1-name.bmp" width="129"
height="34">
                     </p>
                     <table border="0" width="100%" cellspacing="1">
                       <tr>
                         <td width="40%"><font face="Arial"
size="2"><b>Type</b></font></td>
                         <td width="60%"><font face="Arial"
size="2">Apartment</font></td>
                       </tr>
                       <tr>
                         <td width="40%"><font face="Arial"
size="2"><b>Location</b></font></td>
                         <td width="60%"><font face="Arial" size="2">Shah Alam,
                           Selangor</font></td>
                       </tr>
                       <tr>
                         <td width="40%"><font face="Arial"
size="2"><b>Status</b></font></td>
                         <td width="60%"><font face="Arial" size="2">For
Sale</font></td>
                       </tr>
                       <tr>
                         <td width="40%"><font face="Arial" size="2"><b>Land of
                           tenure</b></font></td>
                         <td width="60%"><font face="Arial"
size="2">Leasehold</font></td>
                       </tr>
                       <tr>
                         <td width="40%"><font face="Arial" size="2"><b>Built
Up</b></font></td>
                         <td width="60%"><font face="Arial" size="2">920
sqf</font></td>
                       </tr>
                       <tr>
                         <td width="40%"><font face="Arial"
size="2"><b>Price</b></font></td>
                         <td width="60%"><font face="Arial" size="2">RM
110,000</font></td>
                       </tr>
                     </table>
                     <p align="left">Click <a href="feature_info.htm">here</a>
                     for details &gt;&gt;
```

```
                    </td>
                    <td height="19" width="150">
                      <p align="center">  <img border="0"
 src="images/quick_find.gif" width="128" height="29">
                      </p>
                    </td>
  </tr>
  <tr>
                    <td height="1" width="150">
                      <!--<form Name = "ArrangeForm" action="--WEBBOT-SELF--"
 method="POST" >-->
                      <form action="" name="ArrangeForm"  >
                        <p align="center"><input type="text" name="Tsearch"
 size="20"><br><font face="Arial Narrow" size="2">Enter property
                        search area</font></p>
                        <p align="center"><input type="button" value="Search"
 name="B3" onClick="Search_Click()"></p>
                    </td>
  </tr>
  <tr>
        <td height="3" width="150">
          <p align="center"><img border="0" src="images/need_help.gif"
 width="128" height="19">
        </td>
  </tr>
  <tr>
        <td height="37" width="150">
          <p align="center"><a href="mailto:idamanrealty@hotmail.com"><img
 border="0" src="images/leavemsg1.gif" width="128" height="64"></a>
        </td>
  </tr>
</table>
<p>   </p>

<p>   <img border="0" src="images/updates.gif" width="139"
 height="24"></p>

          <table width="565" border="0" cellspacing="0" height="18"
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            <tr>
              <td width="1291" valign="top" height="230">
                <font face="Arial, Helvetica, sans-serif" size="2"><b>No Same
                Lawyer for Developers and Home Buyers <img height=11
 src="images/new.gif" width=28><br></b></font><font face="Arial, Helvetica,
 sans-serif" size="1">Lawyers
                who representing a housing developer will not allow to
                represent for the purchasers of the project at the same time,
                according to the Bar Council chairman Mah Weng
 Kwai. </font><font face="Arial, Helvetica, sans-serif"
 size="2">       
                </font><b><font color="#cc3333" face="Arial, Helvetica, sans-
 serif" size="2">&gt;&gt;
                <a href="lawyer1.htm" target="mainFrame"><font
 color="#cc3333">full
                story</font></a></font>
                </b>
                <p><font face="Arial, Helvetica, sans-serif">----------------
 ------------------------------------------------</font>
                <p><font face="Arial, Helvetica, sans-serif"
 size="2"><b>States Agree for Government's Plan to Buy Land for Low Cost
                Housing <img height=11 src="images/new.gif"
 width=28></b></font><font face="Arial, Helvetica, sans-serif" size="1"><br>The
                Housing and Local Government Minister Datuk Seri Ong Ka Ting
```

```
                said this would ensure that more low cost housing to be built
                within the cities to meet the demand for such houses by
                low-wage earner and the poor.</font><font face="Arial,
 Helvetica, sans-serif" size="2"> </font><b><font color="#cc3333"
 face="Arial, Helvetica, sans-serif" size="2"> 
                &gt;&gt; <a href="lawyer2.htm" target="mainFrame"><font
 color="#cc3333">full
                story</font></a>
                </font>
                </b>
                <div align="right"> </div>
                <div align="right"><font color="#cc3333" face="Arial,
 Helvetica, sans-serif" size="2"><b><a
 href="http://www.propertyzoom.com/pz/news/danaharta_tender5.htm"
 target=mainFrame><font color="#cc3333" face="Arial, Helvetica, sans-serif"
 size="2">&gt;&gt;
                 </font></a><a href="news.htm" target="mainFrame"><font
 color="#cc3333">more
                 news </font></a></b></font></div>
               </td>
               <td width="378" valign="top" height="230">
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 width="128" height="29"></p>
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 height="160" bordercolor="#C83030" align="center">
                 <tr bordercolor="#FFFFFF">
                   <td height="2"><font size="1" face="Arial, Helvetica, sans-
 serif"> email
                    address :</font></td>
                 </tr>
                 <tr valign="top" bordercolor="#FFFFFF">
                   <td>
                     <div align="center">
                       <input name="Email" size=15 >
                     </div>
                   </td>
                 </tr>
                 <tr bordercolor="#FFFFFF">
                   <td><font size="1" face="Arial, Helvetica, sans-
 serif"> Password
                    :</font></td>
                 </tr>
                 <tr bordercolor="#FFFFFF">
                   <td>
                     <div align="center">
                       <input type="password" name="password" size=15>
                     </div>
                   </td>
                 </tr>
                 <tr bordercolor="#FFFFFF">
                   <td>
                     <div align="center">
                       <input type="image" src="images/sign_button.gif"
 width="64" height="20" border="0" name="I1" onclick = "Btnon_Click">
                       <br>
                     <!--<input type="image" src="images/register_button.gif"
 width="64" height="20" border="0" name="I2" onclick = "BtnReg_Click">-->
                     <!--<img border=0 height=20
 src="images/register_button.gif" width=64 > -->
                     </div>
                   </td>
                 </tr>
```

```
            </table>
          </form>
              <p> 
            </td>
          </tr>
        </table>

<p> </p>
<table border="1" width="122%" cellspacing="0" height="106">
  <tr>
    <td width="22%" bgcolor="#FFCC66" height="36"><font face="Arial Black"
size="2" color="#663300"><img border="0" src="images/money.gif" width="80"
height="72"></font></td>
    <td width="78%" bgcolor="#FFCC66" height="36"><font color="#663300"
face="Haettenschweiler" size="5"> 
      Featured bank loans available:</font>
      <ul>
        <li><a href="ambbloan.htm"><font face="Arial, Helvetica, sans-serif"
size="3">AMBB</font></a></li>
        <li><a href="amfbloan.htm"><font face="Arial, Helvetica, sans-serif"
size="3">AMFB</font></a></li>
        <li><a href="hongleongloan.htm"><font face="Arial, Helvetica, sans-
serif" size="3">
                Hong Leong</font></a></li>
      </ul>
    </td>
  </tr>
</table>

<p align="center"> </p>

<p align="center"><font face="Arial" size="1">Copyright © Idaman Realty 2001 <a
href="disclaimer.htm">*Read
Disclaimer*</a></font></p>

</BODY>
</HTML>
```

```
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=windows-1252">
<meta name="GENERATOR" content="Microsoft FrontPage 4.0">
<meta name="ProgId" content="FrontPage.Editor.Document">
<title>User Registration</title>

<SCRIPT language="Javascript">
<!--
      function Validate(myForm) {

          if (myForm.Email.value == "") {
              alert("\nThe E-MAIL field is blank.\n\nPlease enter your e-mail
address.")
              myForm.Email.value.focus();
            return false;
          }

          if (myForm.Email.value.indexOf ('@',0) == -1 ||
myForm.Email.value.indexOf ('.',0) == -1)
          {
             alert("\nThe E-MAIL field requires a \"@\" and a \".\"be
used.\n\nPlease re-enter your e-mail address.")
             myForm.Email.select();
             myForm.Email.focus();
             return false;
          }

          if (myForm.password.value == "") {
             alert("Must key in password.");
             return false;
          }
   }
   //-->
</script>
<script language = "VBscript">
sub Btnon_Click()
'msgbox document.Register.T1.value

if document.Register.T1.value = "test@hotmail.com"  and
document.Register.T2.value = "test"  then
   window.navigate "Feature_info.htm"

elseif document.Register.T1.value = "lavania@hotmail.com"  and
document.Register.T2.value = "lavania"  then
         window.navigate "Feature_info.htm"
elseif document.Register.T1.value = "bill@microsoft.com"  and
document.Register.T2.value = "bill"  then
         window.navigate "Feature_info.htm"

else
   Msgbox "Email Name or password Mismatch"
end if

end sub

</script>


</head>

<body>
```

```
<p>  </p>

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  <tr>
    <td width="100%" align="center">
      <p align="left"><font face="Arial Black" color="#FFFFFF"
size="4">  MEMBER'S LOGIN</font></td>
  </tr>
</table>
</div>
<p align="justify">

 
<p align="justify">

<font color="#663300" face="Arial" size="2">
Welcome to MyList.</font>
<p align="justify"><font color="#000000" face="Arial" size="2">If
you wish to create a new account on MyList, please go to the <a
href="newregistration.htm">New
Users Registration screen</a>.</font>
<p> </p>
<table border="1" width="98%" cellspacing="0" cellpadding="0" height="116">
  <tr>
    <td width="100%" height="114">
      <p align="center"><font color="#800080" face="Haettenschweiler"
size="5">LOGIN
      HERE</font>
      <form method="POST" action="--WEBBOT-SELF--" onSubmit="" name="Register">
        <!--webbot bot="SaveResults" startspan
        U-File="_private/form_results.txt" S-Format="TEXT/CSV"
        S-Label-Fields="TRUE" --><input TYPE="hidden" NAME="VTI-GROUP"
VALUE="0"><!--webbot
        bot="SaveResults" endspan -->
        <p> <font face="Arial" color="#993399" size="2">Email Address
</font><input id = T1  name="T1"
size="31">         
        </p>


        <p> <font size="2" face="Arial" color="#993399"> Password
</font>      <input id = T2  name="T2"  size="21"
type="password"></p>
      </form>
      <p align="center"><input type="submit" value="Submit" name="B1" onclick
="Btnon_Click()"></p>
    </td>
  </tr>
</table>

</body>

</html>



<html>
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<meta name="GENERATOR" content="Microsoft FrontPage 4.0">
<meta name="ProgId" content="FrontPage.Editor.Document">
<title>Link/Information</title>
</head>

<body>

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       </td>
  </tr>
  <tr>
    <td width="100%">
      <p align="center"><font face="Arial Black" size="3"
color="#663300">LINK</font></td>
  </tr>
</table>
<p> </p>

<table border="1" cellspacing="0" width="100%" cellpadding="0">
  <tr>
    <td width="100%">
      <p align="center"><font face="Century Gothic" color="#800080"><b><a
href="home_buyers_guide.htm">Home Buying Guide</a></b></font><br> <font
face="Arial Unicode MS" size="2" color="#CC0099"> Find out about the procedures
of home
      ownership.</font>
      <p align="center"><font color="#800080" face="Century Gothic"><b><a
href="guideline_hsebuyers.htm">Guidelines for Home Buyers</a></b></font><br>
<font face="Arial Unicode MS" size="2" color="#CC0099"> By Ministry of Housing
&amp; Local
      Government.</font></p>
      <p align="center"><font face="Century Gothic" color="#800080"><b><a
href="guidelinef_housingwithdr.htm">KWSP(EPF) Housing Withdrawal
Scheme</a></b></font><br> <font face="Arial Unicode MS" size="2"
color="#CC0099"> The way to withdraw money from EPF
      to settle your loan.</font></p>
      <p align="center"><b><font color="#800080" face="Century Gothic"><a
href="foreign_investor.htm">Foreign Ownership</a></font></b><br> <font
face="Arial Unicode MS" size="2" color="#CC0099"> Quick guide for
foreigners.</font></p>
      <p align="center"><font face="Century Gothic" color="#800080"><b><a
href="tips.htm">Tips for First Time Buyers</a></b></font><br> <font
color="#CC0099" size="2" face="Arial Unicode MS"> Read about the common fears
of first time
      buyers.</font></p>
      <p align="center"><font face="Century Gothic" color="#800080"><b><a
href="terminology.htm">Real Estate Terminology</a></b></font><br> <font
color="#CC0099" face="Arial Unicode MS" size="2"> Complex terms made
easy.</font></p>
      <p align="center"><font face="Century Gothic" color="#800080"><b><a
href="glossary1.htm">Glossary</a></b></font><br> <font face="Arial Unicode MS"
size="2" color="#CC0099"> All you need to know about real estate.</font></td>
  </tr>
</table>
</body>

</html>
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